S
388.411
M26mutu
1985
Robert Peccia &
Associates
Missoula urban
transportation
plan, 1985 update
6/88

Missoula Urban Transportation Plan 1985 Update

Prepared by
Robert Peccia & Associates
Helena, Montana

STATE DOCUMENTS COLLECTION
JUN 23 1988
MONTANA STATE LIBRARY
1515 E. 6th AVE.
HELENA, MONTANA 59620

PLEASE RETURN

NOV 4 1992

SEP 1 3 1995

MONTANA STATE LIBRARY
S 388.411 M26mutu 1985 c.1
Missoula urban transportation plan, 1985
3 0864 00059127 4

MONTANA STATE
1515 E
HELENA, MONTANA 59620

Missoula Urban Transportation Plan
1985 Update

Prepared for the
Missoula Office of Community Development

in Cooperation with the
Montana Department of Highways
Planning and Statistics Bureau

and

Department of Transportation
Federal Highway Administration

Prepared by
Robert Peccia & Associates

Adopted June 24, 1987
Missoula Policy Coordinating Committee

The opinions, findings, and conclusions expressed in this publication are those of the authors and not necessarily those of the Federal Highway Administration or the Montana Department of Highways.

Transportation Study Organization

Policy Coordinating Committee

John Wicks, Missoula Planning Board - Chairman
Bob Lovegrove, Mayor, City of Missoula
Janet Stevens, Missoula County Commissioner
Charles Schuyler, Missoula Urban Transportation District
Vern Borden, District Engineer, Montana Department of Highways
Roger Scott, Division Administrator, Federal Highway Administration (non-voting member)

Technical Advisory Committee

Bob Holm, Engineering Supervisor, Missoula County, Chairman
Joe Aldegarie, Director of Public Works, City of Missoula
Bruce Bender, Assistant City Engineer, City of Missoula
Horace Brown, County Surveyor, Missoula County
Jim Carlson, Air Pollution Unit, Missoula City-County Health Department
Mark Donaghy, Manager, Missoula Urban Transportation District
Mary Cheryl Larango, Bicycle Coordinator, City of Missoula
Mike Kress, Acting Director, Missoula Office of Community Development
Keenan Bingham, Chief, Planning and Statistics Bureau, Montana Department of Highways
Jim Weaver, Supervisor, District Construction Section, Montana Department of Highways
Bob Lajoie, Supervisor, Engineering Services Section, Montana Department of Highways
Geoff Badenoch, Director, Missoula Redevelopment Agency (non-voting member)
Russ Pankey, Manager, Missoula County Airport (non-voting member)
Don DeGraftenreid, Transportation Planner, Federal Highway Administration (non-voting member)

Montana Department of Highways

Gary Wicks, Director
Bob Champion, Administrator, Program Development Division
Keenan Bingham, Chief, Planning and Statistics Bureau
Bill Cloud, Supervisor, Urban Planning Section
John Lewis, Transportation Planner, Urban Planning Section

Table of Contents

		Page No.
Chapter I: Introduction and Background		1
A.	Description and Purpose	1
B.	Project Background	1
C.	Transportation Goals and Objectives	2
D.	Other Study Considerations	5
1.	Title VI	5
2.	Urban Impact	6
3.	Air Quality	6
4.	Noise	6
5.	Energy	6
6.	Neighborhood Impacts	6
7.	Improvements to Existing System	7
8.	Consideration of Alternatives	7
E.	Previous Studies and Commitments	7
1.	Previous Transportation Studies	7
2.	Committed Major Improvements	8
3.	Committed TSM Improvements	10
F.	Public Participation	11
G.	Major Street Network and Study Area	11
Chapter II: Study Process and Problem Identification		14
A.	Current Transportation Conditions	14
B.	Land Use	15
C.	Socio-Economic Studies	15
D.	Traffic Studies	17
1.	Traffic Counts	17
2.	Level of Service	18
3.	Capacity	21
4.	Signal Analysis	24
5.	Accident Analysis	24
6.	Road Condition Survey	29
F.	Travel Forecasting	29
G.	Transportation System Deficiencies	35
Chapter III: CBD Parking and Traffic Circulation		40
A.	Review of Previous Studies	40
B.	CBD Parking	41
C.	Inventory of Physical Features	42
D.	Existing and Future Traffic Volumes	45
E.	Pedestrian and Bicycle Activity within the CBD	46
F.	Traffic Circulation	47
Chapter IV: Public Transit Systems		51
A.	Metropolitan Bus System	51
B.	Specialized Transportation System	52

Table of Contents (cont.)

Page No.

C. Regional Bus Lines 52
D. Taxi Service 53
E. Air Service 53
F. Rail Service 53
G. Future Developments in Public Transit 54

Chapter V: Transportation System Management Plan 55
A. Methods and Procedures 55
B. Traffic Signal System Evaluation 55
C. Recommended Improvements 58

Chapter VI: Major Network Improvements 67
A. Methods and Procedures 67
B. Recommended Improvements 67

Chapter VII: Financial Plan 85
A. Traditional Funding Sources and Categories 85
1. Federal 85
2. State 89
3. Local 90
B. Local Funding Alternatives 93
1. Local Option Gas Tax 93
2. Transportation Utility 94
3. General Obligation (G.O.) Bond Sale 94
4. Development Exactions 94
5. Tax Increment Financing 94
6. Multi-Jurisdictional Service District 95
7. Local Improvement District 95
8. Other Funding Mechanisms 95
C. Conclusions and Recommendations 95

Chapter VIII: Summary of Recommended Improvements and Implementation 97
A. Recommmended TSM Improvements 97
B. Recommended Major Network Improvements 97

References Cited 101

Bibliography 103

Appendix A: A Summary of the Recommended TSM Improvement Projects 106

List of Tables

		Page No.
Table No. 1:	Population Estimates	17
Table No. 2:	Level of Service Criteria for Signalized Intersections	20
Table No. 3:	Signalized Intersection Capacity	22
Table No. 4:	Future Signalized Intersection Capacity	23
Table No. 5:	Four and One-Half Year Accident History by Hazard Index	26
Table No. 6:	Existing Problem Areas	36
Table No. 7:	Future Capacity Problem Locations	37
Table No. 8:	CBD Parking Inventory	43
Table No. 9:	Committed and Recommended TSM Improvements	59
Table No. 10:	Available Funds Through Federal Aid Highway Programs	89
Table No. 11:	Committed and Recommended Major Network Improvements	99

List of Figures

		Page No.
Figure 1:	Major Street Network	13
Figure 2:	Traffic Analysis Zone Map	16
Figure 3:	Year 1985 Traffic Volumes	19
Figure 4:	Year 2000 Traffic Volumes	30
Figure 5:	Year 2010 Traffic Volumes	31
Figure 6:	Existing Problem Areas	38
Figure 7:	Future Capacity Problem Locations	39
Figure 8:	CBD Physical Inventory	44
Figure 9:	Existing Traffic Within the CBD	45
Figure 10:	TSM Improvement Project Locations	66
Figure 11:	Major Network Improvements	69
Figure 12:	Major Network Improvement No. 8 - Grade Separation of Brooks at South-Brooks-Russell	76
Figure 13:	Major Network Improvement No. 9 - River Crossing in the Vicinity of Van Buren Street	78
Figure 14:	Major Network Improvement No. 14 - B.N. Bitterroot Spur Line	82
Figure 15:	Year 2010 Traffic Volumes Based on Implementation of Major Network Improvements	100
Figure 16:	TSM No. 9 - Broadway and Russell	110
Figure 17:	TSM No. 11 - Scott, Toole, Spruce	112
Figure 18:	TSM No. 12 - Worden, Stoddard, North 5th.	113
Figure 19:	TSM No. 27 - Broadway and Madison	122
Figure 20:	TSM No. 53 - Mount, Park, Franklin, Plymouth.	137
Figure 21:	TSM No. 54 - Higgins, Beckwith, Hill, Mount.	138
Figure 22:	TSM No. 63 - South and Higgins	143
Figure 23:	TSM No. 64 - South and Arthur	144
Figure 24:	TSM No. 76 - Higgins and Pattee Canyon Road	151

Chapter I: Introduction and Background

A. Description and Purpose

The Transportation Plan Update is intended to be used as a guide for providing necessary immediate and long-range improvements to Missoula's major street network. This update contains an investigation and analysis of existing transportation problems within the system and recommendations for improvements that will relieve or reduce these problems as well as provide for future needs.

The types of improvements included in this plan are divided into two categories: 1) network improvements and 2) transportation system management (TSM) improvements. Network improvements are generally defined as consisting of significant additions or modifications to the major street network and involve substantial construction and cost. Transportation system management improvements are intended to maximize the efficiency of the existing facilities and typically consist of little or no construction and relatively low cost. These improvement types are more fully explained in Chapters V and VI. Transportation problems that occur on local streets not considered a part of the major street network are considered the responsibility of the local agencies and are not included as part of this transportation plan.

B. Project Background

The Urban Transportation Plan for Missoula was originally done in 1967 using 1965 data. In 1974 the traffic assignment model was updated and modifications made to the urban study area boundary. In the past two decades changes have occurred in the development of the urban area, the major street network, and the travel demands. Certain elements of the original transportation plan are now obsolete and no longer appropriate.

A "program design" was developed as a guide for conducting the update study. Because of limited staff, the Missoula Office of Community Development chose to use a private engineering and transportation planning firm to assist in preparing the program design and the Transportation Plan Update.

This update is a cooperative effort of the City of Missoula, Missoula County, the Missoula Office of Community Development, the Montana Department of Highways, and the Federal Highway Administration. The project was funded primarily with federal and state match planning funds with some contribution by the Missoula Redevelopment Agency.

The Consultant was guided through the performance of the study by the Missoula Transportation Technical Advisory Committee (TAC) which consists of technically-qualified local, state, and federal representatives.

C. Transportation Goals and Objectives

The Missoula Policy Guide for Urban Growth established the community's goals for the transportation system. These goals are aimed at the development of a balanced system that will provide for the movement of traffic while addressing the impacts of the transportation system on other aspects of the community. The primary goals and objectives of the transportation system are as follows:

Transportation Goals and Objectives[1]

A. REDUCTION OF TRAVEL TIME.

1. Shorten travel distance from residential areas to areas of major trip generating activities by planning for future development.

2. Reduce congestion by spot improvements to existing facilities and by reducing the number of vehicles by car pooling and mass transit.

3. Separate incompatible types of traffic by developing truck routes for the larger vehicles.

4. Consider all modes of transportation including bicycle, pedestrian, mass transit, and others when evaluating travel time.

B. INCREASED HEALTH AND SAFETY.

1. Implement spot improvements to reduce vehicular and pedestrian accidents.

2. Maintain the mass transit system as a means of reducing pollution as well as the number of vehicles, thus reducing accidents.

3. Provide safer pedestrian travel facilities.

4. Provide exclusive or shared transportation facilities for bicycle travel.

5. Maintain vehicles and facilities for transporting the handicapped and the elderly. Incorporate design considerations for the movement of this segment of population into the design of new facilities and the improvements of existing facilities.

6. Design and maintain future transportation improvements to sustain federal air quality standards. Missoula is presently considered a non-attainment area by federal standards.

C. LOWER OPERATING COSTS.

1. Decrease the wear on vehicles by improving facility maintenance.

2. Decrease the number of vehicles by encouraging car pools, use of the mass transit system, developing design standards to facilitate bicycle use, and by improving pedestrian travel facilities.

3. Adopt design life standards to be used in the design of new facilities and the reconstruction of existing facilities.

4. Develop truck routes to minimize damage to facilities not designed for large wheel loads.

D. ECONOMY OF NEW CONSTRUCTION

1. Consider increased private investment in setting priorities for new construction and improvements to the transportation system.

2. Adopt design standards for new facilities and improvement to the transportation system.

E. MINIMIZING DISRUPTION.

1. Disruption to existing land uses should be minimized during construction of new or improved facilities.

2. Utility improvements should be coordinated with improvements to transportation facilities to minimize disruption to both systems.

F. PROMOTING BETTER LAND DEVELOPMENT.

1. The future transportation system should be designed to implement as well as serve the land use plan.

2. The function of each facility within the transportation system should be defined and coordinated with the land use plan. For example, the primary function of a major arterial is traffic movement. Access to adjacent properties should be minimized and developments along these facilities should be designed so that access is provided by streets with that function and not directly from the major arterial.

3. The impact of new development on transportation facilities should be a requirement in evaluating zone changes or zoning of unzoned property.

G. REDUCTION OF ENERGY CONSUMPTION.

1. The public transit system should be maintained to more efficiently move people over the transportation system.

2. The bikeway system should be updated periodically.

3. Congestion should be minimized.

4. Adequate parking should be provided at major trip generators to minimize the amount of nonproductive travel required to find a parking space.

5. A network of pedestrian travelways should be developed to encourage this mode of travel.

H. INCREASE PEDESTRIAN ACCESS.

1. Pedestrian travel should be encouraged by developing convenient pedestrian access to major trip generators. Pedestrian malls and walkways should be included as elements of the transportation system.

2. Pedestrian facilities should incorporate design elements that facilitate the movements of the elderly and the handicapped.

I. REDUCE COSTS OF FUTURE FACILITIES.

1. The cost of future transportation facilities should be shared by major developments that create or increase the need for new facilities and improvements.

2. A long-range improvement plan should be adopted based upon ability-to-pay so that projects can be scheduled, designed and constructed on a systematic basis.

J. PROVIDE FOR STREET BEAUTIFICATION.

1. Provide for planted medians where possible to complement the surrounding area.

2. Provide long-range development planning for boulevard beautification.

3. Identify street reconstruction and beautification redevelopment.

4. Provide curb/gutter and sidewalks on main travel ways.

K. IDENTIFY AND PROMOTE LEGISLATION FOR TRANSPORTATION IMPROVEMENTS.

1. Expand appropriations for community transportation improvements.

2. Promote enabling legislation for accomplishment of projects.

L. PROVIDE MAINTENANCE STANDARDS.

1. Identify standard maintenance construction practices.

2. Set policy for traffic restriping frequencies.

3. Set policy for maintenance jurisdiction.

4. Set up development and capital improvement plans for major maintenance and reconstruction projects.

M. DEVELOPMENT OF OFF-STREET PARKING FACILITIES.

1. Provide convenient off-street parking facilities in the downtown area.

2. Insure that new development provides off-street parking.

N. PROMOTE CIVIC PRIDE FOR IMPROVEMENT OF ADJACENT PROPERTIES.

1. Improved sidewalks and curbs.

2. Improved appearance of buildings and surroundings.

D. Other Study Considerations

1. Title VI

Following the approved goals and objectives, the recommended plan of improvements is based on solving identified transportation problems in the Missoula study area. The plan is designed to benefit the Missoula community as a whole. It is not expected that any recommended improvement would directly or significantly affect any socio-ethnic group.

2. Urban Impacts

Throughout the process of preparing this Transportation Plan Update, special attention has been given to the needs of the downtown area. Improvements recommended in this plan provide better access to the Central Business District (CBD) and improved traffic circulation with the downtown shopping area. It is anticipated that the recommended improvements will enhance the economic climate in the CBD through new development, increased employment and retail sales. This plan is consistent with the Missoula Policy Guide for Urban Growth.

3. Air Quality

The air quality in Missoula has become a significant issue in recent years. The recommended transportation improvements in this plan are aimed at reducing vehicle delays and traffic congestion while improving travel speeds. Improved traffic flow characteristics produce an overall reduction in traffic generated pollution. In cases where pavement widening is recommended, the air quality will benefit from reductions in the re-entrainment of particulate matter from the unpaved roadway shoulders as well as reduced concentrations of carbon monoxide due to the larger dispersion area available. Efforts have been made to recommend improvements that will properly size the transportation system components to handle the anticipated demands through the use of future traffic projections.

4. Noise

Vehicle generated noise pollution is an unfortunate side effect of transportation. During the planning process, special consideration has been given to roadway corridors where traffic volumes are expected to drastically increase in the future. In these cases appropriate facility sizes and necessary right-of-way widths have been recommended.

5. Energy

Although recent gas prices have declined from the record levels of the past few years, energy consumption is still an important issue. This report emphasizes the use of transportation system management improvements to improve traffic operations. These projects require little in the way of committed resources and will be an immense benefit for the amount invested. Certain major improvements require substantial resources and energy commitments but are necessary for an efficient transportation system. The net result of these investments will be an energy savings.

6. Neighborhood Impacts

The Transportation Plan has incorporated previous studies on major route designations and proposed improvements that are still appropriate. Very little, if any, relocation is expected since most of the improvements will be on

existing routes. Participation in the transportation planning process has also been encouraged through an extensive series of neighborhood meetings held by the Missoula Office for Community Development throughout the planning area.

7. Improvements to Existing Systems

As mentioned under Item 4, Energy, this Transportation Plan has emphasized low-cost transportation system management-type improvements. These improvements require little or no construction, improve efficiency, and increase the use of existing facilities. Considering that funding for transportation system improvements is limited, this is a prudent and practical approach.

8. Consideration of Alternatives

A large number of potential improvements were identified as the Transportation Plan improvements program was being developed. These were reduced through a review and testing process to assure that the appropriate improvements were being selected. In those cases where the improvements could be computer modeled, the Department of Highways tested the proposed improvements using the traffic assignment model. The final improvement plan was a result of the consideration of a number of alternative improvements narrowed to the most beneficial improvements with a practical funding program.

E. Previous Studies and Commitments

Previous studies relating to transportation planning in the Missoula area were used as a data source for the preparation of this Transportation Plan Update. These documents were prepared to guide in the development of the transportation system. Previous commitments for improvements to the system have also been taken into account in this update. A summary of the information used for the Transportation Plan Update is as follows:

1. Previous Transportation Studies

a. Urban Transportation Plan, 1967

A comprehensive study of the transportation system was prepared for the Missoula urban area by Clark, Coleman, Rupeiks, Inc. This document contains a thorough investigation of the major transportation deficiencies and recommendations for improvements. Many of the elements of this plan are still applicable. The current update is intended to modify those elements of the original plan that are no longer valid due to changes in the condition of the transportation system.

b. Missoula Urban Transportation Study Update, 1974

This report, which was prepared by Daily-Peccia and Associates, was primarily concerned with documenting the status of the current transportation

system through data collection and various traffic studies. The main element of the final product was a calibrated traffic assignment model which was used to project future traffic volumes.

c. A Policy Guide for Urban Growth, 1975

The Missoula Planning Board produced this report which has functioned as a guide for future development of the Missoula urban area. The transportation goals and objectives of the community were defined as part of this study.

d. Parking and Feasibility Study of the Central Business District, 1979

E.A. Barton produced this study at the request of the Missoula Parking Commission. This document defined the current transportation system in the Central Business District (CBD) through physical inventories and parking studies. The study also identified the CBD parking supply and demand as well as future parking needs.

e. Parking Development Plan, 1980

The purpose of this document, which was prepared by Clete Daily, was to update previous parking studies and develop a parking improvement program for the CBD.

f. Transit Development Plan, 1983

The Mountain Line produced this document which outlines the state of the Mountain Bus Line system as well as the current and future transit demand. The operating performance of the system was evaluated, and a five-year improvement program developed.

g. Missoula Transportation Plan Update, Program Design; 1984

As the initial phase of the update process, Robert Peccia & Associates developed this program design which establishes the work elements to be included in the actual Transportation Plan Update. This document was used as the principal guide in the formulation of this plan update.

2. Committed Major Improvements

a. Reserve Street, South Third to Brooks, M-8103(4)

This project consists of reconstructing Reserve Street to a four-lane facility including upgrading the signal systems at the intersections of South Third, South Avenue and Brooks Street. The EIS portion of this project has been completed.

Estimated Project Cost: $8,335,214

Funding Source: Federal Aid Urban Funds

b. South Russell Street, Mount to Brooks

This project involves pavement widening to four lanes of approximately one-third mile of Russell Street. No activity is scheduled for this project at this time.

Estimated Project Cost: $114,000

Funding Source: State Maintenance Revenue Funds
City Gas Tax Funds

c. Mullan Road RS263-1(4)1

This project consists of reconstruction of 5.3 miles of Mullan Road from Flynn Lane to Deschamps Lane. The bid letting date has not been set for this project.

Estimated Project Cost: $4,531,150

Funding Source: Federal Aid Secondary Funds

d. I-90, Missoula to Bonner, IR90-2(75)106

This improvement includes concrete surface rehabilitation of approximately 4.6 miles of Interstate 90 from the Van Buren Interchange to Bonner. A contract was awarded on the project on March 26, 1987.

Estimated Project Cost: $1,705,400

Funding Source: Interstate-4R Funds

e. Reserve Street Overpass, RTF 71-1(6)1

This project consists of a pavement overlay, seal and cover of 1.6 miles of Reserve Street beginning at I-90 and extending to the south side of the Reserve Street Overpass over Broadway. A tentative letting date of May 28, 1987 has been set for this project.

Estimated Project Cost: $128,000

Funding Source: Reconstruction Trust Fund

f. CBD Passenger Terminal

This project consists of the construction of a new off-street CBD passenger terminal to service Missoula's Mountain Line bus system. The project is currently on hold.

Estimated Project Cost: $1,250,000

Funding Source: Urban Mass Transit Assistance Funds

3. Committed TSM Improvements

a. Reserve Street Bridge

Widen existing bridge over the irrigation canal south of Seventh Street to accommodate a sidewalk along both sides. This project was completed by County crews during 1986.

Estimated Project Cost: $5,500

Funding Source: County Bridge Funds

b. South Avenue Bridge

This project involves the widening of the existing bridge on South Avenue at Schilling Street to accommodate a sidewalk along one side. Construction was performed by County crews during 1986.

Estimated Project Cost: $5,000

Funding Source: County Bridge Funds

c. South Avenue Walkway East

The project consists of the acquisition of right-of-way necessary to provide for a paved walkway/bikeway along South Avenue from 38th Street to Reserve Street.

Estimated Project Cost: $30,000

Funding Source: County Road Funds

d. State Route Improvements

The project involves the reconstruction and/or pavement overlay of several roads on the major street network. The work is anticipated to be completed over the next three years. Roads to be improved as part of this project are:

Van Buren - I-90 to city limits
Orange Street - Stephens to bridge
Orange Street - Underpass to Broadway
Russell Avenue - Mount to Third
Russell Avenue - South Avenue to Mount

Higgins Avenue - Daly to Mount
South Avenue - Regent to Bancroft

Estimated Project Cost: $200,000

Funding Source: State Maintenance Revenue Funds

e. Street Reconstruction Program

The City plans to perform street reconstruction and/or overlays including some curb and gutter replacement on certain city streets as part of this project. Construction is anticipated during the 1986-87 construction seasons. Streets to be improved under the program include:

Toole Avenue - Broadway to Scott

It should be noted that this project involved other local streets; only the improvements to the major street network have been listed herein.

Estimated Project Cost: $100,000

Funding Source: City Gas Tax Fund

F. Public Participation

Ongoing citizen participation and review have been considered essential and important elements of this planning process since its inception. During development of this document, efforts were made to keep interested groups abreast of the progress and direction of the study. These groups included the Chamber of Commerce, the Citizens Advisory Committee, the Airport Authority, the Missoula Redevelopment Agency, the Missoula Urban Transportation District, the Missoula Policy Coordinating Committee, the Missoula County Commissioners, the Mayor and City Council, Missoula School District No. 1, the Missoula Planning Board, and the Missoulian. Numerous neighborhood meetings held in various Missoula residential areas allowed for public review of the draft document and provided a platform from which public questions and comments were received on the plan. After publication of the draft document, the Missoula Planning Board will conduct a formal public hearing, once again allowing for public input prior to final acceptance of the document.

G. Major Street Network and Study Area

For purposes of this update, the study area includes the entire urban area and a small portion of Missoula County. The boundary is illustrated in Figure 1.

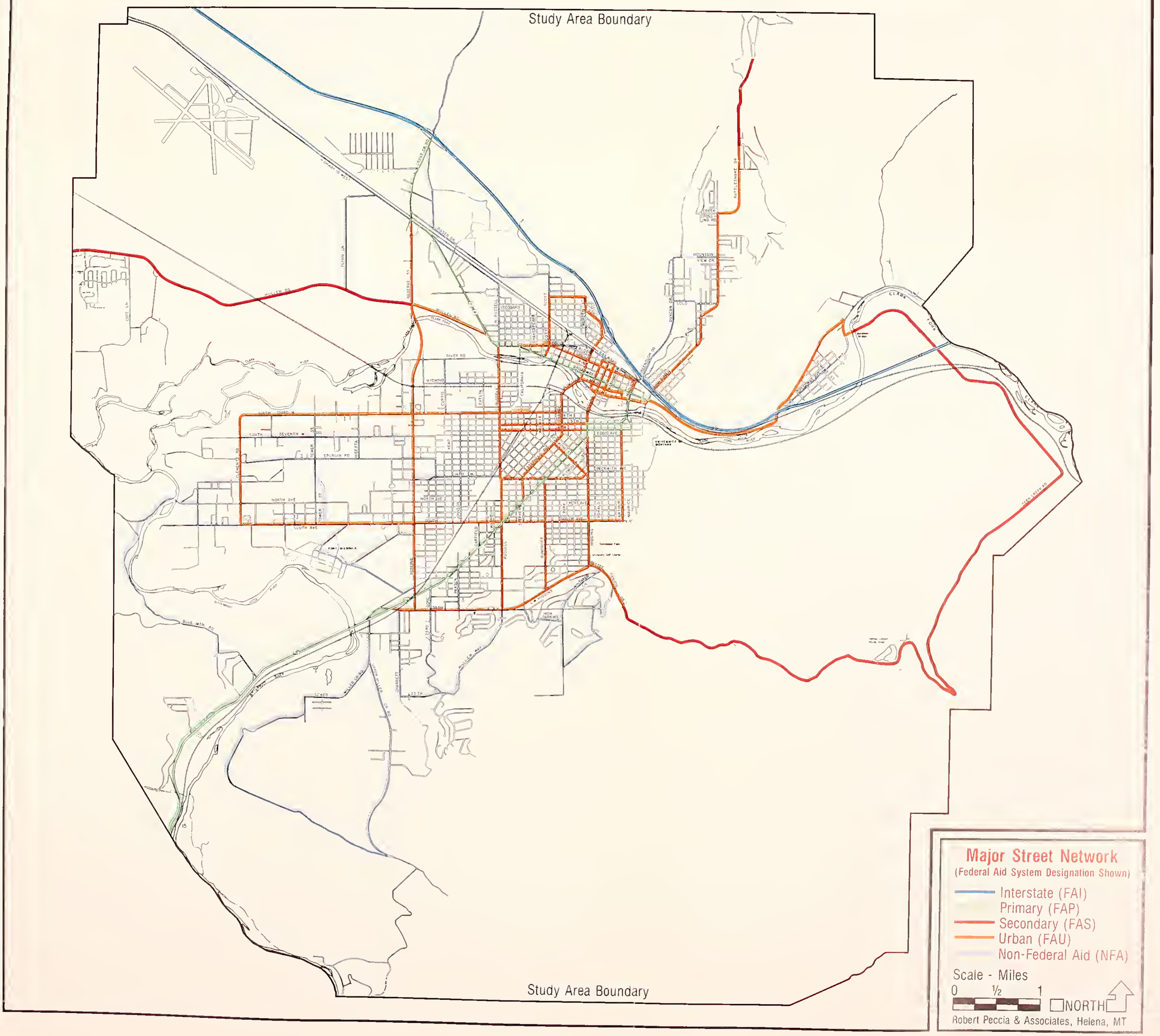
The primary function of this plan update is to concentrate on the major problems that occur on the most important streets of the transportation system. An initial step in the development of this update is to identify those streets that are considered most important and define the major street network. The criteria used to establish the major street network are as follows: 1) all roads and streets having a functional classification as a collector, arterial, or interstate were included as part of the major street network; 2) all roads or streets on the federal aid system were considered a part of the major street network; and 3) other streets that do not meet the first two criteria but provide a vital link in the system were included as part of the major street network.

During the study process, the following changes to the major street network were recommended and approved by the Technical Advisory Committee:

- Replace Otis Street (from Scott Street one block west) with Rodgers Street
- Replace Stoddard Street (from Scott to Warren) with Turner Street
- Delete Wyoming from Curtis to Davis and delete Davis from Wyoming to River Road. Replace these links with Curtis from Wyoming to River Road and River Road from Curtis to Davis
- Delete 11th from Kemp to Russell
- Add 14th from Russell to Eaton and Eaton from 14th to Spurgin
- Delete North from Bancroft to Arthur
- Delete loop at north end of Rattlesnake Drive
- Add Tower between Spurgin Road and South Avenue
- Add Hillview Way, 55th Street, 23rd Street, and Gharrett Avenue to create a loop through the South Hills
- Delete Raser Drive from Grant Creek to Reserve Street
- Add Grant Creek Road from I-90 to the study area boundary
- Add Dore Lane between 39th and Brooks
- Delete Fifth and Sixth Streets between Russell and Reserve Streets

The major street network is shown in Figure 1 with all streets classified according to the Federal Aid Funding Systems designation. The proposed changes to the system, which are mentioned above, have been incorporated into the network displayed in Figure 1.

Figure 1: Major Street Network



Chapter II: Study Process and Problem Identification

A. Current Transportation Conditions

To fully examine the urban transportation system one must look at a wide variety of information. The transportation system is comprised of many parts including roads, bridges, and traffic signals as well as the vehicles that use them. Data pertaining to the pavement condition, roadway widths, intersection geometrics, and signal timing was compiled by the Consultant. This information defined the size and condition of the physical features of the system. To examine the performance of these physical features, the travel characteristics of the vehicular traffic must be identified. A variety of traffic studies was performed by the Consultant in an effort to define the traffic volumes, travel speeds, vehicle progression and the location, and amount of congestion and delays.

In general, the transportation network of arterial and collector routes within the Missoula urban area function effectively. The majority of the system carries the vehicle demand at acceptable travel speeds with only minimum delays. In fact, driving studies indicate a motorist can travel between the outermost portions of the study area and the Central Business District in less than 15 minutes. Compared to many large urban areas in the nation, the Missoula area experiences only minor congestion during the peak travel periods.

The junction of South-Brooks-Russell is Missoula's most congested intersection.

There are, however, certain intersections and roadway segments that are having difficulty passing existing traffic volumes. The most notable problem is the intersection of South - Brooks - Russell. The intersection of these three

major travel corridors constitutes a major bottleneck with rather far reaching effects. The problem lies in the fact that the intersection must handle six approach volumes and a wide variety of turning movements. The intersection is presently operating at capacity; and as volumes increase in the future, measures such as limiting turning movements or re-routing traffic to eliminate an approach will have to be taken to maintain an acceptable traffic flow.

Another intersection that constitutes a major point of congestion is the intersection of South and Reserve. This situation is primarily a result of heavy turning movement volumes being handled by undersized approaches.

Many of the traffic problems that occur within the study area are interrelated and require major improvements to the street network while other problems are localized and require only minor adjustments to yield greater efficiency.

Through the studies and analysis described in this chapter, the major deficiencies in the vehicular transportation system have been identified. The recommended improvements outlined in this report are intended to provide relief to many problem locations while planning for the future transportation needs of the Missoula area.

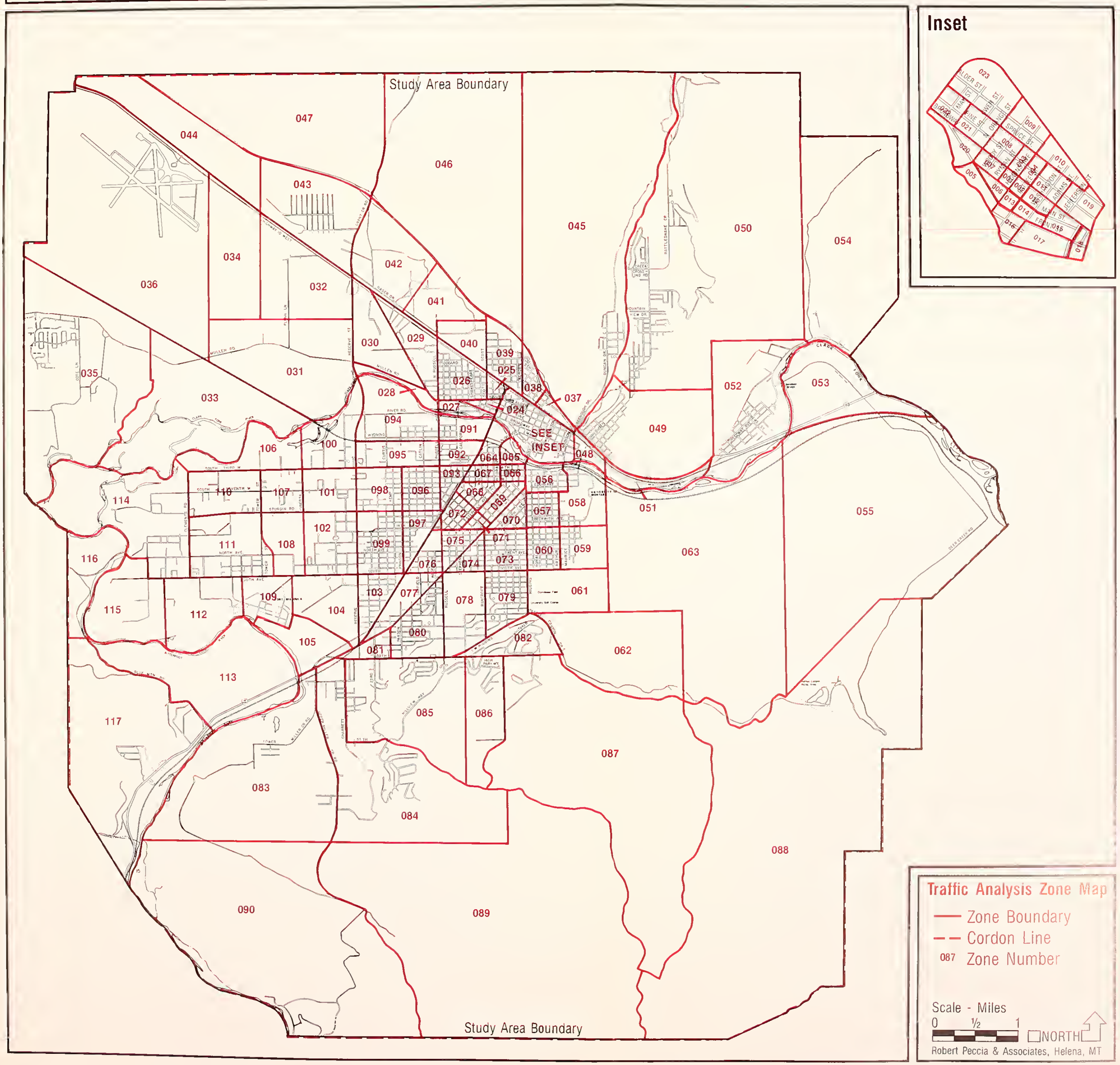
B. Land Use

The present plan for land use in the study area was developed as part of the 1975 Missoula Policy Guide for Urban Growth. Since that time, the Missoula Office of Community Development has monitored more recent growth within the urban area through building permit applications and zoning changes. This ongoing inventory of the land use served as a basis for making projections of future land use development and for preparing socio-economic projections.

C. Socio-Economic Studies

As part of the transportation planning process, the Missoula Office of Community Development was responsible for providing current and projected socio-economic data, including population and employment projections, for the study area for the base year 1985 and the years 1990, 2000 and 2010 by traffic analysis zones. To accomplish this the study area was divided into 117 individual traffic analysis zones as shown in Figure 2. For each zone, population and employment data was developed using the 1980 census data. This information was supplemented with additional research pertaining to new commercial establishments. Through the use of historic growth patterns for each zone and a linear regression program the socio-economic conditions in future years was developed. Detailed population and employment statistics by transportation zone are on file in the Missoula Office of Community Development.

Figure 2: Traffic Analysis Zone Map



The existing and projected populations for the Missoula urban area and Missoula County are listed below in Table No. 1.

TABLE NO. 1

POPULATION ESTIMATES[2]

Area	1980 Census	Base Year 1985	1990	2000	2010
City of Missoula	33,400	34,000	36,000	40,000	42,000
Missoula Urban Area	61,600	62,400	67,800	77,400	88,400
Missoula County	76,000	77,000	84,800	96,800	110,500

D. Traffic Studies

The evaluation of an urban transportation system requires a variety of information about the system. Several traffic studies were conducted to provide current data necessary for a proper evaluation. These studies included traffic counts, a capacity analysis of all signalized intersections, a travel time and delay study conducted on all major routes, a level of service analysis of all arterial routes, a signal analysis, an accident analysis, and a pavement condition survey. The information developed from these studies forms the basis for the determination of problem areas and deficiencies within the urban transportation system. These studies and their results are discussed in more detail below.

1. Traffic Counts

Traffic surveillance counts are taken periodically at 161 locations within the Missoula urban area by Montana Department of Highways (MDOH), the City and County. This extensive traffic counting program provides valuable historical data on traffic volumes and characteristics. A permanent traffic recorder located on Orange Street south of the bridge has been providing a continuous record since 1966. Using seasonal adjustment factors developed from the permanent count data, the surveillance counts are adjusted to represent the annual average daily traffic (AADT). The 1985 traffic volumes are shown graphically on Figure 3.

In addition to these counts, the Consultant conducted manual turning movement counts during the daily peak hour period at the 41 signalized intersections within the urban area. This information was essential in the evaluation of the operating characteristics of the signalized intersections.

2. Level of Service

The effectiveness of a roadway can be evaluated by determining the level of service of the facility. For urban and suburban arterials the level of service is based on average travel speeds. The average travel speed is computed from vehicle running speeds and intersection approach delays. For the purposes of this study, the Consultant performed travel time and delay studies using the floating car method on all major travel routes throughout the urban area. These studies provide the necessary data for determining the level of service provided by the urban arterials.

Through the use of methods outlined in the 1985 Highway Capacity Manual, each arterial is classified according to facility size, geometric characteristics, roadside development, and signal spacing. The arterial classification determines the acceptable range of travel speeds for each type of facility. The level of service is determined by comparing the calculated average travel speed for an arterial with the bracketed range of speeds for that class of highway.

The following general statements may be made regarding arterial level of service.[3]

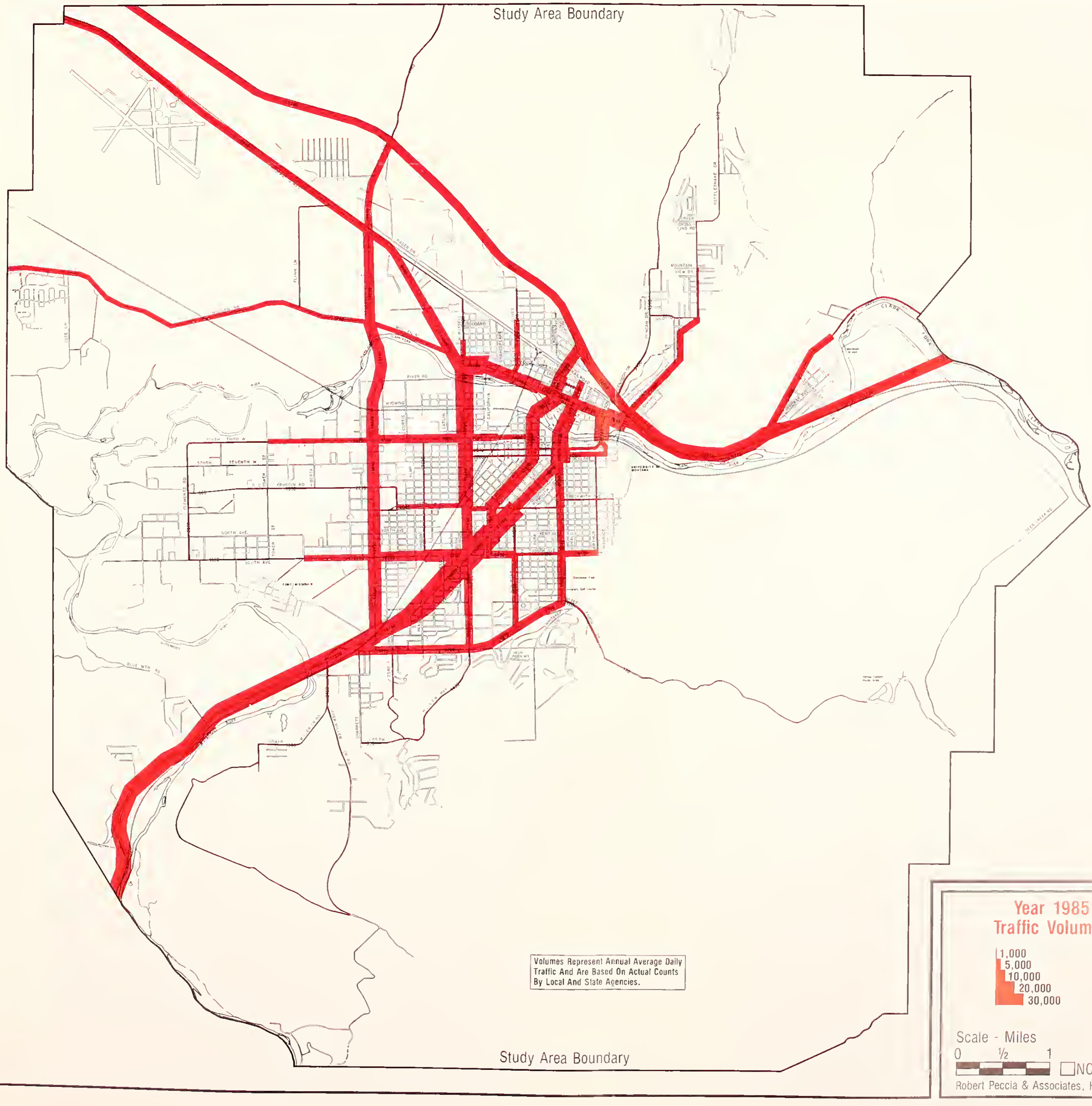
Level-of-service A describes primarily free flow-operations at average travel speeds usually about 90 percent of the free flow speed for the arterial class. Vehicles are completely unimpeded in their ability to maneuver within the traffic stream. Stopped delay at signalized intersections is minimal.

Level-of-service B represents reasonably unimpeded operations at average travel speeds usually about 70 percent of the free flow speed for the arterial class. The ability to maneuver within the traffic stream is only slightly restricted and stopped delays are not bothersome. Drivers are not generally subjected to appreciable tension.

Level-of-service C represents stable operations. However, ability to maneuver and change lanes in midblock locations may be more restricted than in LOS B, and longer queues and/or adverse signal coordination may contribute to lower average travel speeds of about 50 percent of the average free flow speed for the arterial class. Motorists will experience an appreciable tension while driving.

Level-of-service D borders on a range on which small increases in flow may cause substantial increases in approach delay and, hence, decreases in arterial speed. This may be due to adverse signal progression, inappropriate signal timing, high volumes, or some combination of these. Average travel speeds are about 40 percent of free flow speed.

Figure 3: Year 1985 Traffic Volumes



Level-of-service E is characterized by significant approach delays and average travel speeds of one-third the free flow speed or lower. Such operations are caused by some combination or adverse progression, high signal density, extensive queuing at critical intersections, and inappropriate signal timing.

Level-of-service F characterizes arterial flow at extremely low speeds below one-third to one-quarter of the free flow speed. Intersection congestion is likely at critical signalized locations, with high approach delays resulting. Adverse progression is frequently a contributor to this condition.

The results of the level-of-service analysis indicates that the majority of the Missoula arterials are providing a Level-of-service C or better. There were several locations determined to have slow travel speeds, and in those cases a poor level of service. The only arterial segments providing unacceptable service levels (D, E or F) at the time of the study were Reserve Street in the vicinity of the South Avenue intersection and Brooks Street near the intersection of South and Russell. It should be noted that the average travel speeds used in this analysis are based on average travel data from five trips in each direction for each arterial. Four trips were driven during peak traffic flow periods and one during off-peak flow conditions. The slowest travel speeds (less than 15 mph) were recorded within the CBD on short sections of Orange Street, Broadway, Higgins, and Madison. These slow speeds do not necessarily indicate a poor level of service. In this case, the speeds reflect a major function of these streets which is to provide access to the downtown businesses. In fact all of the arterials within the CBD are operating at Level-of-service C or better.

The level of service provided at signalized intersections is based on vehicle delay and is presented in Table No. 2.

TABLE NO. 2

LEVEL OF SERVICE CRITERIA FOR SIGNALIZED INTERSECTIONS

Level of Service	Average Stopped Delay per Vehicle (sec)
A	$\leq$ 5.0
B	5.1 to 15.0
C	15.1 to 25.0
D	25.1 to 40.0
E	40.1 to 60.0
F	> 60.0

Typically it is desirable for intersections to provide a Level-of-service C or better on all approaches. Intersections with at least one approach providing Level-of-service D or worse are listed below:

Broadway/Van Buren	Brooks/Stephens	South-Brooks-Russell
Broadway/Madison	Brooks/Reserve	South/Reserve
Broadway/Orange	S. 3rd/Reserve	South/Higgins
Broadway/Russell	S. 3rd/Orange	

For the purposes of problem identification, any intersection or arterial road section providing a Level-of-service D, E or F was considered a potential problem area.

3. Capacity

The measure by which a particular highway fulfills its function of carrying traffic is determined by a capacity analysis. The capacity of a facility is defined as "the maximum hourly rate at which vehicles can reasonably be expected to traverse a point during a given time period under prevailing roadway, traffic and control conditions."[4] Within urban areas the capacity of a street is typically controlled by the capacity of the at-grade intersection along the street.

For the purposes of problem identification, all signalized intersections within the Missoula urban area were analyzed with respect to current traffic volumes as well as projected traffic for the year 2010. Each intersection was analyzed using the planning method for signalized intersections as outlined in the 1985 Highway Capacity Manual. Using this procedure conflicting critical volumes are summarized to produce a capacity indicator value. Using the following criteria, a general assessment can be made of the intersection approach volume with respect to the overall intersection capacity.

Capacity Indicator Value	Capacity Level
0 - 1200	Below
1201 - 1400	Near
> 1400	Over

In all cases the 30th highest hourly volume was used in the analysis. The results of the analysis are presented in Table No. 3 (1985) and Table No. 4 (2010). For the purposes of this study, any intersection having a capacity indicator value greater than 1200 was identified as a potential problem area.

TABLE NO. 3

SIGNALIZED INTERSECTION CAPACITY
(Based on 1985 Volumes and Existing Road Geometrics)

	Intersection	Capacity Indicator Value	
1	South-Brooks-Russell	1577	
2	South & Reserve	1440	
3	3rd & Russell	1408	
4	3rd & Reserve	1402	over capacity 1400
5	Orange-Main-Front	1367	
6	South & Higgins	1347	
7	Broadway & Madison	1281	
8	3rd & Orange	1237	
9	Russell & Mount	1203	near capacity 1200
10	Brooks & Higgins	1187	
11	Reserve & Brooks	1179	
12	5th & Russell	1141	
13	Broadway & Russell	1132	
14	Orange & Broadway	1125	
15	Reserve & Mullan	1123	
16	Brooks & Mount	1077	
17	5th & Orange	1061	
18	South & Grant	1060	
19	Broadway & Van Buren	1054	
20	Brooks & Grant	1038	
21	Brooks & Beckwith	978	
22	6th & Orange	976	
23	Orange & Spruce	967	
24	5th & Higgins	939	
25	Broadway & Higgins	905	
26	Brooks & Paxson	883	
27	Russell-Higgins-39th	869	
28	6th & Higgins	855	
29	Brooks & Stephens	844	
30	Brooks & Fairview	841	
31	Stephens & Mount	809	
32	Stephens & Beckwith	742	
33	Spruce & Higgins	732	
34	6th & Arthur	714	
35	Beckwith & Arthur	710	
36	Front & Higgins	682	
37	Broadway & Pattee	664	
38	Main & Higgins	646	
39	4th & Higgins	613	
40	Pine & Higgins	603	
41	Broadway & Ryman	566	

TABLE NO. 4

FUTURE SIGNALIZED INTERSECTION CAPACITY
(Capacity Based on Projected Year 2010 Volumes
with Existing Roadway Geometrics)

	Signalized Intersection	Capacity Indicator Value	
1	3rd & Reserve	3180	
2	Brooks & Mount	2601	
3	South & Reserve	2318	
4	South-Brooks-Russell	2277	
5	Reserve & Mullan	2186	
6	3rd & Russell	2171	
7	Brooks & Beckwith	2122	
8	Reserve & Brooks	2071	
9	Brooks & Higgins	2052	
10	3rd & Orange	2040	
11	Russell & Mount	2038	
12	Broadway & VanBuren	1800	
13	Broadway & Madison	1757	
14	Orange & Broadway	1573	
15	Brooks-Catlin-Fairview	1564	
16	Broadway & Higgins	1496	
17	Orange-Main-Front	1482	
18	South & Higgins	1469	
19	5th & Orange	1445	
20	Brooks & Stephens	1433	
21	5th & Higgins	1420	
22	5th & Russell	1405	over capacity 1400
23	Stephens & Mount	1376	
24	6th & Arthur	1302	
25	Russell-Higgins-39th	1291	
26	6th & Orange	1258	
27	6th & Higgins	1222	
28	Broadway & Russell	1216	
29	South & Grant	1204	near capacity 1200
30	Beckwith & Arthur	1158	
31	Brooks & Grant	1101	
32	Broadway & Pattee	1041	
33	Orange & Spruce	1040	
34	Brooks & Paxson	994	
35	Main & Higgins	988	
36	Broadway & Ryman	941	
37	Higgins & Spruce	882	
38	Higgins & Front	859	
39	Stephens & Beckwith	752	
40	4th & Higgins	718	
41	Higgins & Pine	709	

4. Signal Analysis

Recognizing that traffic signals are the major element of traffic control, a special study of the traffic signal system was performed. Each signalized intersection was examined, and the physical and operational characteristics observed. The signal installation and operation was checked for conformance with the Manual on Uniform Traffic Control Devices (MUTCD). Signal turnings and phasings for each location were reviewed for appropriateness and effectiveness.

The Missoula area currently has 42 traffic signals; 26 are fully or semi-traffic actuated, 15 have pre-timed controllers, and one is solely pedestrian actuated. Fifteen of the signalized intersections are interconnected to at least one other signalized location and provide coordinated operation. The other 28 signals function independently. The pre-timed controllers are mostly located in the CBD where traffic volumes and patterns are predictable and consistent pedestrian activity exists. The traffic actuated controllers are located at intersections where traffic volumes vary and pedestrian traffic is light. The application of the traffic signal hardware throughout the system is correct and in conformance with MUTCD.

Signal phasings and timings were reviewed and found to be appropriate, although some signal timings were found to be "sluggish". In general the signal system moves the traffic effectively with only a few exceptions.

In cases where extensive queuing of traffic occurs at a signalized intersection, it is often the result of a geometric capacity restraint. Some of the current signal equipment is functionally limited and unable to provide the flexibility required to accommodate complex traffic demands. A more detailed evaluation of the signal system is presented in Chapter V along with recommended improvements.

5. Accident Analysis

An accident investigation was conducted to evaluate the current accident characteristics of the Missoula urban area. A four and one-half year study period from January 1, 1980 through July 1, 1984 was selected for the purposes of this analysis. Accident records were obtained from the Montana Department of Justice Highway Information System (HIS) program. The State's records were cross referenced against the records of the County Surveyor's Office to produce a complete data base.

In the initial review any intersection or County road section (.2 of a mile in length) having nine or more accidents within the four and one-half year study period was identified. The initial review produced a total of 89 locations. These locations were then rated according to a method contained in FHWA Report No. FHWA-Rd-77-83 "Identification of Hazardous Locations." Each location was analyzed with respect to accident number, accident rate, and

accident severity. Each of these factors was then assigned an indicator value and a weighted average calculated. This weighted average is referred to as the Hazard Index (HI). A ranking of the HI values provides a means to evaluate the relative hazardousness of each location. According to the FHWA Report, any location having a HI (based on the three accident indicators) that exceeds 34.37 is considered very hazardous, while an HI of 16.93 is the dividing line between a location being considered hazardous or normal. This analysis identified 17 locations as being hazardous. These locations and their accident statistics are listed in Table No. 5.

In addition to those locations identified as hazardous through the use of the hazard index, any location having an accident rate of 1.0 ACC/MVE was identified as a problem location and was further investigated for possible improvements. This additional criteria increased the number of problem locations to a total of 21 intersections or road sections.

It should be noted that 59 accidents, including two fatalities, occurred on Pattee Canyon Road (M.P. 0 to M.P. 3.5). This section of road is considered an accident problem area and was investigated for possible improvements. The Pattee Canyon Road location, which is 3.5 miles in length, could not be accurately ranked along with the other locations identifed in this analysis but was generally considered hazardous and worthy of investigation.

TABLE NO. 5

FOUR AND ONE-HALF YEAR ACCIDENT HISTORY BY HAZARD INDEX
(1/1/80 - 7/1/84)

Rec ID	Location	Hazard Index	Total	Fatality	Property Injury	Damage	Severity	Accident Rate
1	South and Washburn	24.61	66	0	16	50	1.24	2.27
2	S. 3rd and Clements	23.43	12	0	5	7	1.42	3.78
3	S. 14th and Johnson	22.17	17	0	9	8	1.59	2.76
4	*S. 10th and Garfield	20.34	10	0	2	8	1.20	3.15
5	Reserve and Spurgin	20.29	37	0	15	22	1.41	1.50
6	*Eddy & Ronald	19.93	9	0	3	6	1.33	2.83
7	Reserve and River Br.	19.67	22	1	10	11	1.67	1.41
8	S. 4th and Walnut	19.35	9	0	5	4	1.55	2.27
9	Broadway and Higgins	19.25	43	0	12	31	1.28	1.29
10	Mullan Road (M.P. 2.0-2.2)	18.69	14	0	6	8	1.43	1.96
11	S. 6th and Higgins	18.18	29	0	7	22	1.24	1.39
12	I-90 - East Missoula Int.	18.14	23	1	8	14	1.56	1.06
13	Reserve and Mullan	17.40	27	0	9	18	1.33	1.12
14	Mullan Road (M.P. 2.9-3.1)	17.39	14	0	4	10	1.29	1.68
15	South and Reserve	17.26	38	0	8	30	1.21	0.97
16	S. 7th and Reserve	17.20	26	0	9	17	1.35	1.08
17	East Broadway and I-90	17.00	18	0	8	10	1.44	1.22
18	Hwy. 10 W. & Airport Ent.	16.35	11	1	4	6	1.80	0.91
19	South - Brooks - Russell	15.96	42	0	9	33	1.21	0.60
20	Main and Higgins	15.91	27	0	3	24	1.11	1.04
21	Broadway and Orange	15.86	33	0	6	27	1.18	0.80
22	Brooks and Reserve	15.56	29	0	8	21	1.28	0.71
23	South and Eaton	15.49	22	0	6	16	1.27	0.87
24	So. 3rd and Reserve	15.38	25	0	7	18	1.28	0.78
25	Front and Higgins	15.38	24	0	6	18	1.25	0.78
26	14th and Eaton	15.26	13	0	2	11	1.15	1.53
27	Mullan Road (M.P. 0.9-1.1)	15.23	10	0	4	6	1.40	1.24
28	Broadway and Madison	15.07	26	0	7	19	1.27	0.66
29	Front and Orange	14.97	24	0	8	16	1.33	0.67
30	39th/23rd/Dore Lane	14.90	18	0	6	12	1.33	0.86

*Not on the major street network.

TABLE NO. 5 (CONT.)

FOUR AND ONE-HALF YEAR ACCIDENT HISTORY BY HAZARD INDEX
(1/1/80 - 7/1/84)

Rec ID	Location	Hazard Index	Total	Fatality	Property Injury	Damage	Severity	Accident Rate
31	I-90 - Van Buren Int.	14.89	17	0	7	10	1.41	0.79
32	Broadway and Van Buren	14.86	23	0	7	16	1.30	0.72
33	Pine and Higgins	14.86	15	0	8	7	1.53	0.67
35	South and Schilling	14.69	17	0	7	10	1.41	0.74
36	Main and Ryman	14.60	12	0	3	11	1.21	1.08
37	Reserve and Mount	14.52	19	0	7	8	1.47	0.68
38	39th and Russell	14.51	19	0	5	14	1.26	0.80
39	Mount and Stephens	14.36	18	0	5	13	1.28	0.82
40	Russell and Wyoming	14.29	16	0	8	8	1.50	0.61
41	S. 5th and Higgins	14.26	22	0	7	15	1.32	0.55
42	Broadway and Russell	14.26	23	0	7	16	1.30	0.56
43	North and Johnson	14.17	9	0	4	5	1.44	0.84
44	Stephens and Kensington	14.04	20	0	3	17	1.15	0.91
45	S. 3rd and Catlin	13.72	14	0	6	8	1.43	0.63
46	S. 5th and Maurice	13.72	13	0	3	10	1.23	0.92
47	Russell and Sussex	13.67	15	0	4	11	1.27	0.72
48	Pine and Orange	13.58	10	0	5	5	1.50	0.75
49	Beckwith and Stephens	13.48	15	0	4	11	1.27	0.66
50	Russell and River Rd.	13.16	12	0	7	5	1.58	0.46
51	Reserve and River Rd.	13.08	12	0	5	7	1.42	0.61
52	Russell and North	13.03	17	0	2	15	1.12	0.79
53	Brooks and Paxson	13.03	18	0	4	14	1.22	0.55
54	South and Bancroft	13.01	14	0	4	10	1.29	0.61
55	Orange and Alder	12.97	15	0	3	12	1.20	0.68
56	Reserve and Central	12.88	12	0	5	7	1.42	0.53
57	Brooks and Oxford	12.85	17	0	4	13	1.24	0.48
58	S. 3rd and Russell	12.79	17	0	5	12	1.29	0.41
59	Brooks and Stephens	12.79	17	0	5	12	1.29	0.42
60	South and Kemp	12.50	14	0	3	11	1.21	0.58
61	Strand and Stephens	12.46	15	0	2	13	1.13	0.67
62	Broadway and Washington	12.45	10	0	4	6	1.40	0.55
63	Brooks and Bow	12.40	10	0	2	8	1.20	0.74
64	Broadway and Pattee	12.36	13	0	3	10	1.23	0.62

TABLE NO. 5 (CONT.)

FOUR AND ONE-HALF YEAR ACCIDENT HISTORY BY HAZARD INDEX
(1/1/80 - 7/1/84)

Rec ID	Location	Hazard Index	Total	Fatality	Property Injury	Damage	Severity	Accident Rate
65	S. 3rd and Orange	12.27	13	0	4	9	1.31	0.47
66	S. 6th and Orange	12.03	11	0	4	7	1.36	0.44
67	Brooks and McDonald	12.01	12	0	3	9	1.25	0.48
68	Brooks and Higgins	11.97	15	0	3	12	1.20	0.42
69	Russell and Kent	11.88	13	0	2	11	1.15	0.64
70	Brooks and Fairview	11.84	17	0	2	15	1.12	0.49
71	39th and Brooks	11.79	9	0	5	4	1.55	0.28
72	South and Oxford	11.76	12	0	2	10	1.17	0.66
73	Brooks and Kent	11.50	16	0	2	14	1.13	0.46
74	Brooks and Kensington	11.32	11	0	3	8	1.27	0.39
75	Orange and Spruce	11.18	10	0	4	6	1.40	0.39
76	Brooks and Beckwith	11.17	9	0	3	6	1.33	0.35
77	Brooks and Livingston	11.09	9	0	2	7	1.22	0.52
78	Broadway and Ryman	11.04	11	0	2	9	1.18	0.52
79	Burlington and Stephens	10.87	10	0	2	8	1.20	0.45
80	S. 5th and Russell	10.77	12	0	2	10	1.17	0.40
81	Broadway and Front	10.49	9	0	2	7	1.22	0.35
82	S. 4th and Higgins	10.29	12	0	1	11	1.08	0.44
83	Brooks and Garfield	10.10	10	0	3	7	1.30	0.33
84	Main and Pattee	10.01	13	0	1	12	1.08	0.36
85	S. 6th and Arthur	9.88	9	0	1	8	1.11	0.44
86	Brooks and Regent	9.41	10	0	0	10	1.00	0.55
87	Spruce and Higgins	8.66	9	0	0	9	1.00	0.41
88	S. 14th and Russell	8.47	9	0	1	8	1.11	0.35
89	Brooks and Catlin	7.87	9	0	1	8	1.11	0.24

6. Road Condition Survey

A large portion of a community's transportation budget is typically used to maintain the existing roadways. The deterioration of the local street network combined with inadequate roadway sections is a common problem in urban areas. The major street network was inventoried and evaluated by the Consultant and all roadways rated as good, fair, poor, and very poor. This survey was used to identify those portions of the network that have pavement surfacing problems.

The majority of the roads that make up the major street network are in fair condition. There were many short sections of road rated as poor, usually only several blocks in length. The most notable sections considered to be predominantly in poor condition were Russell, Orange Street, South Avenue, and portions of Reserve, South Third and 39th. The roads rated as very poor were Clements Road, Pattee Canyon Road, Mullan Road, Fort Road, Post Siding Road, and portions of Raser Drive, Grant Creek Road, Van Buren Street, and Main Street. All of the data generated from this inventory was compiled graphically and is on file at Missoula's Office of Community Development.

F. Travel Forecasting

Due to the complexities of the major street network and travel demands, it is not practical to simply apply historical growth factors to existing traffic counts to yield future traffic volumes. Therefore, urban traffic projections are commonly developed through the use of computerized traffic assignment models. The model utilized for the purposes of the transportation plan was the "PLANPAC/BACKPAK" model developed by the Federal Highway Administration. This model is utilized by the Department of Highways to assess future traffic condition in urban areas of Montana. This model combines traffic generation parameters such as population and employment with travel characteristics in a number of traffic zones within the urban area to estimate traffic volumes on the major street network. The projections of future socio-economic conditions and the traffic data which describes operational characteristics of the network are primary model inputs necessary to project future traffic volumes.

For the purposes of this transportation plan traffic volumes were developed from the model to represent the anticipated traffic loadings on the network in the years 2000 and 2010. These future traffic volumes are presented graphically in Figures 4 and 5.

These projected volumes are used to assess the ability of the major street network to meet the needs of future traffic demand.

As a general rule, an urban roadway will approach capacity when the average daily traffic (ADT) volume exceeds 12,000 vehicles per day (VPD) on a two-lane road and 25,000 VPD for a four-lane facility. When applying this

Figure 4: Year 2000 Traffic Volumes

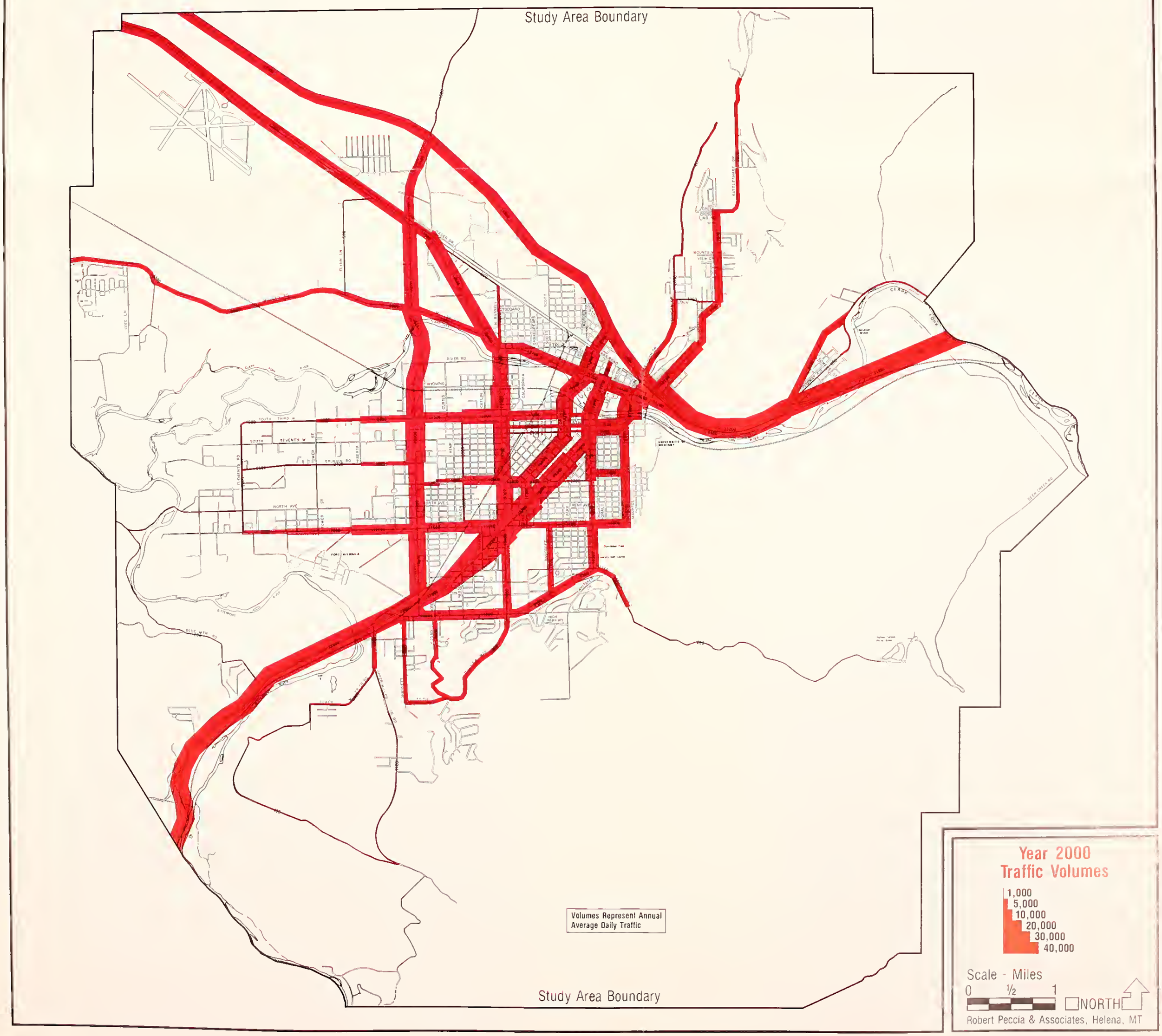
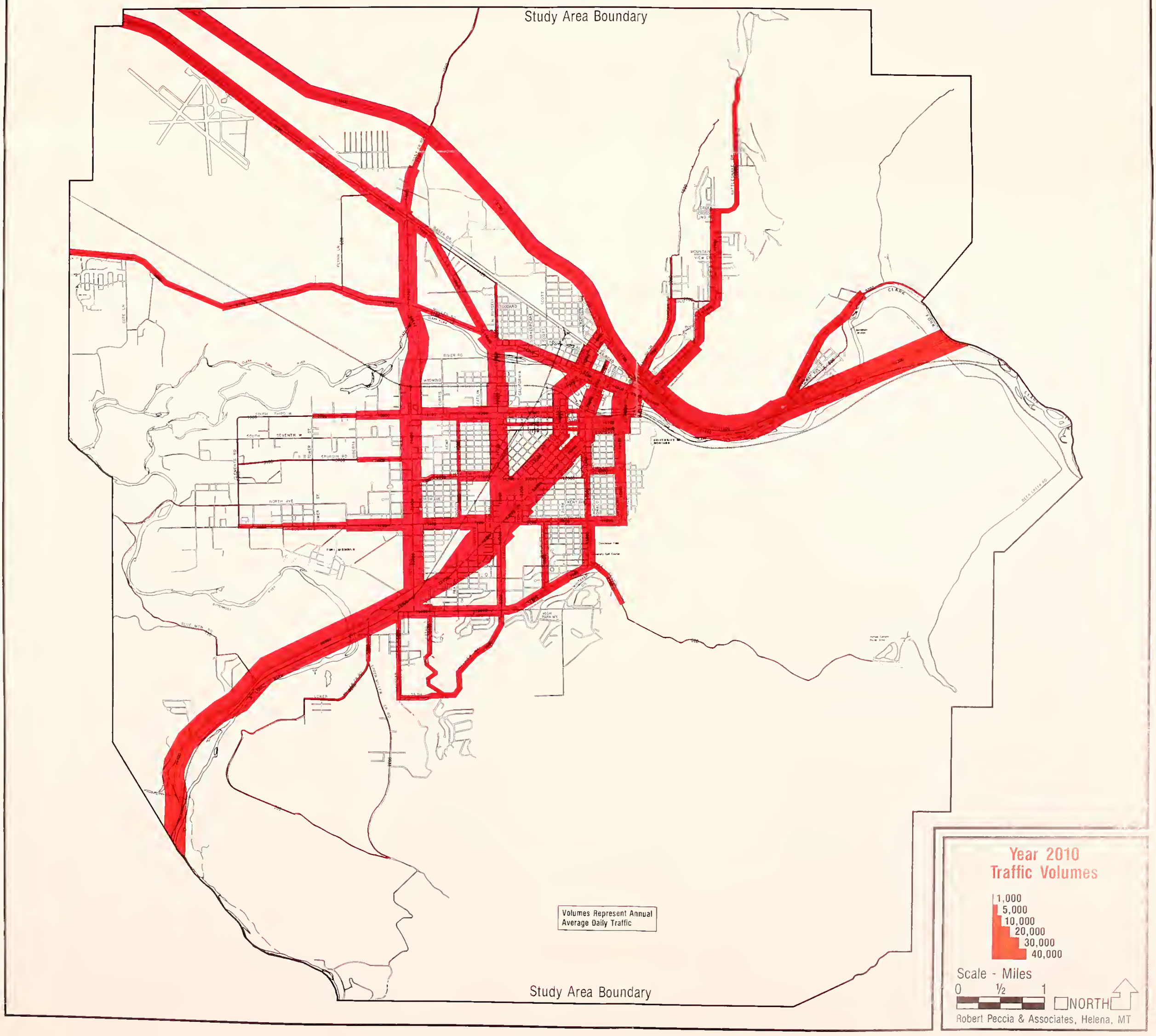


Figure 5: Year 2010 Traffic Volumes



criteria to the existing and projected volumes on the major street network, the following potential roadway capacity problems become apparent:

1985

- Reserve Street, between Broadway and Brooks
- Russell Street, between Broadway and South Avenue
- Orange Street, between the RR underpass and Stephens Avenue
- Brooks, between Higgins and Mount
- South Third West, between Russell and Johnson
- South Avenue, between Russell and Johnson

2000

(All of the above, plus):

- Brooks, between Stephens and Fairview
- South Avenue, between Reserve and Tower
- 39th, between Brooks and Dore Lane
- Higgins, between South Avenue and Pattee Canyon Road
- Mount Avenue, between Russell and Stephens
- Madison Street Bridge
- Van Buren, between Vine and Missoula Avenue

2010

(All of the above, plus):

- 39th, between Dore Lane and Russell
- 93 South, from Reserve Street to the Study Area boundary
- South Avenue, between Johnson and Reserve
- Higgins, between Brooks and Mount
- Fifth and Sixth, between Higgins and Arthur
- Broadway, between Madison and Van Buren
- South Third, between Orange Street and Reserve

In addition to providing traffic projections for the existing major street network, the traffic assignment model can provide valuable information concerning possible route alternatives. When analyzing the projected volumes and resulting problems on the existing system, possible modifications and additions to the network were examined. Route alternatives were proposed by TAC for examination during the study review process and modeled using the Montana Department of Highways' computerized traffic assignment model. The Mount/14th extension west from Eaton to Reserve was included in all model runs. This was to update the model and reflect the construction of this project which was completed during the summer of 1986.

In each test run certain changes or additions to the major street network were superimposed on the existing system. This would allow the effects of a particular modification to the system to be analyzed with respect to future

traffic projections. These tests help to determine the possible benefits and drawbacks to each alternative tested. The results of the alternative test runs are on file at the Office of Community Development in Missoula and at the Planning and Statistics Bureau of the Montana Department of Highways in Helena and are summarized below.

Test Run #1

- 14th/Mount extension west from Eaton to Reserve
- Grade separation of Brooks at S-B-R intersection with ramp connections on Stephens, Kent, Catlin, and Fairview
- Auto bridge over Clark Fork at Van Buren
- Butler Creek Interchange

Summary:

- The 14th/Mount extension, which completed the east-west corridor, increased traffic loadings on Mount by approximately 1,000 VPD over the previous network configuration. This result was the same in all of the other test runs.

- The grade separation functioned very well carrying 28,600 VPD (down from 40,000 VPD) while the connector streets loaded as follows:

  Stephens - 2,300 VPD
  Kent - 5,800 VPD
  Catlin - 7,200 VPD
  Fairview - 8,100 VPD

  The surface intersection at South and Russell yielded very acceptable approach volumes which can be handled with conventional intersection geometrics. The resulting volumes are displayed in Figure 12 contained in Chapter VI of this report.

- The Van Buren Street Bridge loaded extremely well and would be expected to carry over 18,000 VPD while reducing the traffic on the Madison Street Bridge from 34,000 VPD to a very acceptable 17,000 VPD. A similar reduction in traffic was realized on Broadway between Van Buren and Madison Streets.

- The Butler Creek Interchange diverted approximately 200 VPD from old Highway 10 onto the Interstate. The link between the Interchange and Highway 10 loaded approximately 1,300 VPD. The small amount of cross-over traffic is partially due to the fact the Interchange is located very close to the exterior boundary of the model.

Test Run #2

- 14th/Mount extension west from Eaton to Reserve
- North side Frontage Road between Orange, Greenough, and Van Buren
- Intersection modifications at Higgins and Beckwith

Summary

- The Northside Frontage Road loaded approximately 5,000 VPD indicating that it would be desirable to have a road connection of this type. Unfortunately, there was not a significant reduction in traffic on Van Buren Street.

- The realigned intersection at Higgins and Beckwith produced very acceptable volumes on the four approaches while indicating no adverse effects on the surrounding traffic circulation.

Test Run #3

- 14th/Mount extension west from Eaton to Reserve
- Western connection of Fifth/Sixth Street couplet at Reserve Street
- Cross connector between Greenough and Rattlesnake at Creek Crossing
- North side connector between Orange Street and Creek Crossing

Summary

- The western connection of the 5th/6th couplet only loaded approximately 1,000 VPD indicating this type of link addition would not have a significant effect on the other high volume corridors.

- The cross-connector between Greenough and Rattlesnake modeled at 8,000 VPD causing a redistribution of the traffic on the two north-south corridors.

- The connection of a link between the Orange Street Interchange and the above-mentioned cross-connector at Greenough and Creek Crossing produced a shift in local traffic. The connection loaded at over 5,000 VPD and reduced the traffic on lower Van Buren Street from 11,000 VPD to 5,000 VPD. A reduction of 2,000 VPD was realized on Greenough Road.

Test Run #4

- 14th/Mount extension west from Eaton to Reserve
- BN - Bitterroot spur line connection between Brooks/Dore and the Fifth/Sixth Street couplet

Summary

- The BN Spur Line used as an arterial produced excellent results. If constructed, the arterial would produce a very beneficial shift of 14,000 VPD away from the Brooks Street corridor and cause a similar reduction of 10,000 VPD on Russell Street. The new crosstown arterial would carry over 20,000 VPD.

G. Transportation System Deficiencies

The initial phase of this update concentrated on defining the operational characteristics of the transportation system. Through the studies and analysis covered in this chapter, certain deficiencies in the system have been identified. These deficiencies can be classified into two types: 1) traffic operational deficiencies, and 2) street network deficiencies.

The operational deficiencies are related to problems caused by the inefficient operation of the existing facilities. Typically these types of deficiencies can be remedied with minor improvements such as traffic signal phasing or timing adjustments, more effective signing and/or striping techniques, better channelization of traffic or applying on-street parking restrictions.

Street network deficiencies, however, are characterized by problems that would require a significant modification to the street network such as the addition of a road section to the major street network, widening or reconstruction of a street, or altering the roadway geometric configuration to the extent that traffic patterns are altered.

The deficiencies were identified by noting areas with excessive congestion and delays, high accident locations, streets and intersections that are nearing or will exceed capacity, and roadways with poor pavement condition. The existing transportation problem areas are presented in Table No. 6 and graphically displayed on Figure 6, "Major Problem Areas". Those locations considered to be problem areas, based on capacity, by the year 2010 are listed in Table No. 7 and presented graphically in Figure 7.

TABLE NO. 6

EXISTING PROBLEM AREAS

		Accident Problems	Existing Capacity Problems	Level of Service Problems
Intersections				
1	South & Washburn	X		
2	South 3rd & Clements	X		
3	S. 14th & Johnson	X		
4	*South 10th & Garfield	X		
5	Reserve & Spurgin	X		
6	*Eddy & Ronald	X		
7	Reserve & River Br.	X		
8	South 4th & Walnut	X		
9	Broadway & Higgins	X		
10	Mullan Rd. (M.P. 2.0-2.2)	X		
11	South 6th & Higgins	X		
12	I-90 - East Missoula Int.	X		
13	Reserve & Mullan	X		
14	Mullan Rd. (M.P. 2.9-3.1)	X		
15	South & Reserve	X	X	X
16	South 7th & Reserve	X		
17	East Broadway & I-90	X		
18	Main & Higgins	X		
19	14th & Eaton	X		
20	Mullan Rd. (M.P. 0.9-1.1)	X		
21	Main & Ryman	X		
22	Pattee Canyon Rd. (M.P. 0.0-3.5)	X		
23	South-Brooks-Russell		X	X
24	South 3rd & Russell		X	
25	South 3rd & Reserve		X	X
26	Orange-Main-Front		X	
27	South & Higgins		X	X
28	Broadway & Madison		X	X
29	South 3rd & Orange		X	X
30	Russell & Mount		X	
31	Broadway & Russell			X
32	Brooks & Reserve			X

Roadway Sections with Capacity Problems

1 Reserve St. between Broadway & Brooks
2 Russell St., between Broadway & South Ave.
3 Orange St., between the RR underpass & Stephens Ave.
4 Brooks St., between Higgins & Mount
5 South 3rd West, between Russell & Johnson
6 South Ave., between Russell & Johnson

*Not on the major street network.

TABLE NO. 7

FUTURE CAPACITY PROBLEM LOCATIONS
(Based on Year 2010 Volumes and Existing Roadway Geometrics)

Signalized Intersections

1 3rd & Reserve
2 Brooks & Mount
3 South & Reserve
4 South-Brooks-Russell
5 Reserve & Mullan
6 3rd & Russell
7 Brooks & Beckwith
8 Reserve & Brooks
9 Brooks & Higgins
10 3rd & Orange
11 Russell & Mount
12 Broadway & Van Buren
13 Broadway & Madison
14 Orange & Broadway
15 Brooks-Catlin-Fairview
16 Broadway & Higgins
17 Orange-Main-Front
18 South & Higgins
19 5th & Orange
20 Brooks & Stephens
21 5th & Higgins
22 5th & Russell
23 Stephens & Mount
24 6th & Arthur
25 Russell-Higgins-39th
26 6th & Orange
27 6th & Higgins
28 Broadway & Russell
29 South & Grant

Roadway Sections

1 Reserve St., between Broadway & Brooks
2 Russell St., between Broadway & South Ave.
3 Orange St., between the RR underpass & Stephens Ave.
4 Brooks, between Higgins & Mount
5 South Ave., between Russell & Reserve
6 Brooks, between Stephens & Fairview
7 South Ave., between Reserve & Tower
8 39th, between Brooks and Russell
9 Higgins, between South Ave. & Pattee Canyon Rd.
10 Mount Ave., between Russell & Stephens
11 Madison St. Bridge
12 Van Buren, between Vine & Missoula Ave.
13 93 South, from Reserve St. to the Study Area boundary
14 Higgins, between Brooks & Mount
15 5th & 6th, between Higgins & Arthur
16 Broadway, between Madison and Van Buren
17 South 3rd, between Orange St. & Reserve

Figure 6: Existing Problem Areas

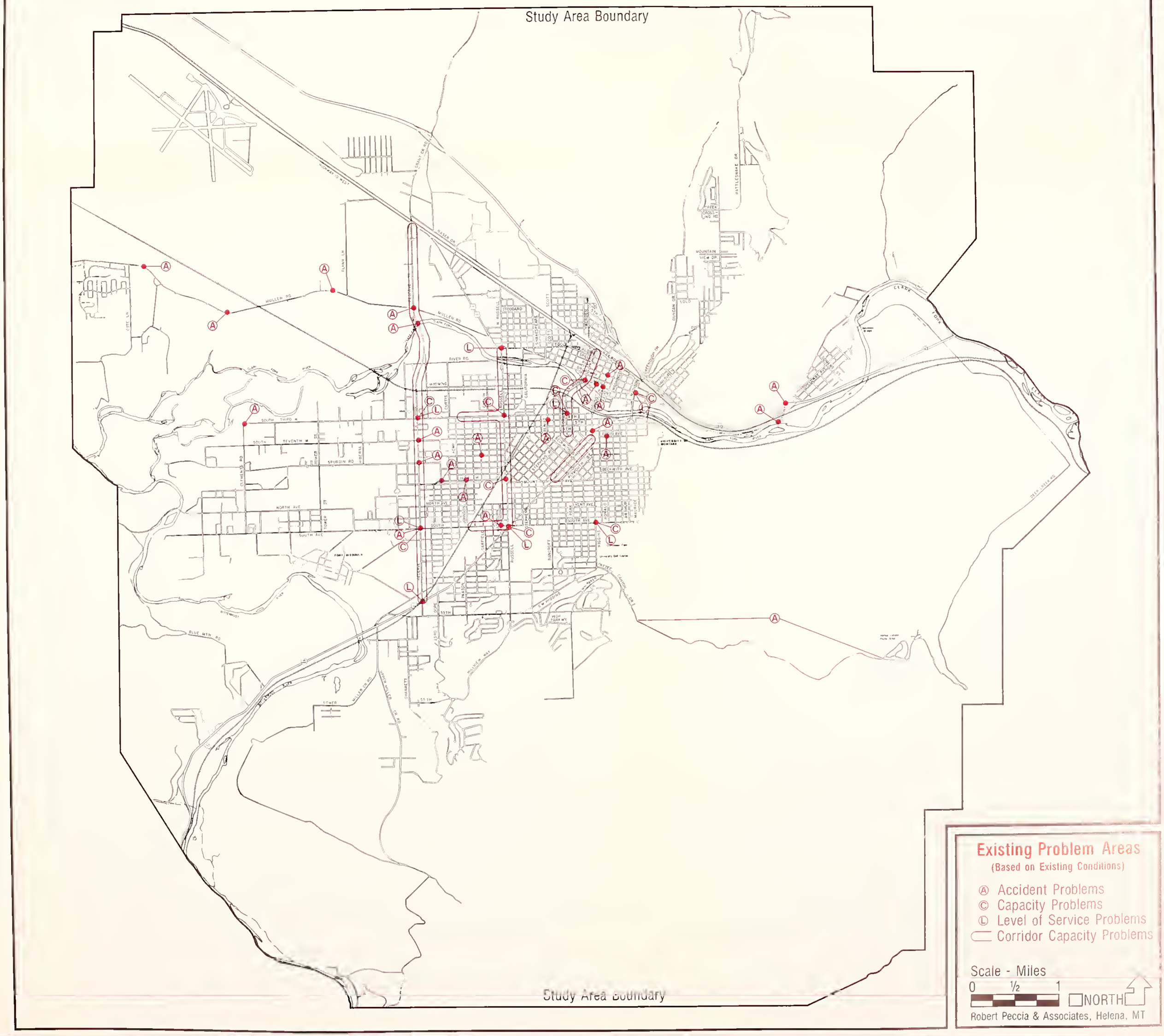
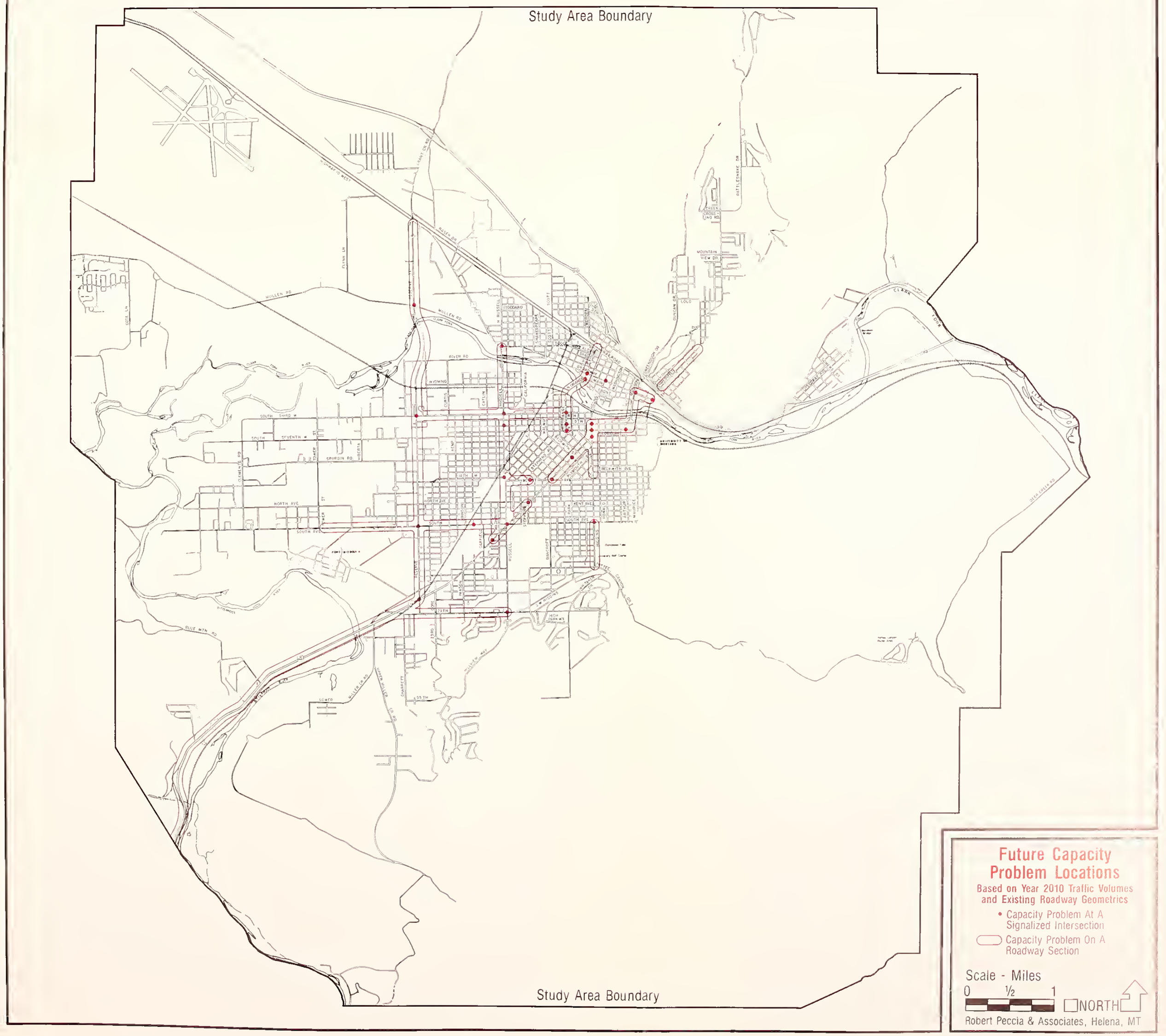


Figure 7: Future Capacity Problem Locations


Study Area Boundary
Study Area Boundary
Future Capacity Problem Locations
Based on Year 2010 Traffic Volumes and Existing Roadway Geometrics
• Capacity Problem At A Signalized Intersection
Capacity Problem On A Roadway Section
Scale - Miles
0 ½ 1
NORTH
Robert Peccia & Associates, Helena, MT

Chapter III: CBD Parking and Traffic Circulation

A. Review of Previous Studies

Several reports previously performed for the Missoula area specifically address the Central Business District (CBD). A review of these documents provides a historic perspective of the traffic and parking demands of the CBD.

1. Urban Transportation Plan, 1967, Clark, Coleman, Rupeiks, Inc.

This study describes the condition of the transportation and parking systems of the CBD.

During peak parking periods in 1965, the entire CBD parking system achieved an occupancy level of 59%. The report indicated a need for 104 short-term and 203 long-term parking spaces within the CBD. This document also included an in-depth evaluation of the parking characteristics of the Central Business District. In addition the study covered traffic volumes, travel speeds, and the traffic circulation of the CBD street network.

2. Parking and Feasibility Study of the Central Business District, 1979, E.A. Barton and Associates

The findings of this report indicate a parking deficiency within the CBD of approximately 1,170 spaces in 1979 and projected a deficiency of 1,350 spaces by the year 1985. The occupancy level of the on-street parking spaces averaged 75% during the typical weekday with recordings of 84-88% during peak demand periods. Almost 50% of the off-street lots within the CBD "core" area are full or near full several times during the average weekday. The report identified the greatest parking deficiency area within the CBD as the four city blocks bounded by Ryman Avenue, Broadway, Pattee, and Front Streets. It recommended the construction of several multi-level parking structures and surface lots as well as an increase in both on-street and off-street parking rates to help finance the improvements.

3. Parking Development Program, 1980, Clete Daily

The purpose of this report was to produce an improvement program to be implemented by the Parking Commission that would provide the necessary additional parking spaces within the CBD. The data requirements necessary to establish a Parking Special Improvement District were also compiled as part of this study. This report indicated an overall decrease in both on-street and off-street parking had occurred since 1965 resulting in a parking deficiency of 778 spaces within the CBD. The difference in deficiencies between this report

and the 1979 Feasibility Study was attributed to the use of a lower demand rate and a slightly different study area boundary. The study offered several improvement alternatives including the construction of as many as six surface lots and one multi-level parking structure. The Development Program adopted by the Parking Commission called for the construction of three new surface lots and a preliminary design for a parking structure.

B. CBD Parking

As mentioned in the previous section, a Parking Development Program was adopted by the Parking Commission in 1980. This program consisted of the construction of three surface lots and the preliminary design of a multi-level parking structure. The total cost of the program was approximately $2.2 million. All of the program objectives have been completed over the last five years. The three new public off-street lots provide an additional 225 parking spaces to the CBD parking supply. The preliminary design of the parking structure produced a four-story facility to be located on the site of one of the new surface lots located on Main Street between Ryman and Higgins. Final design and construction of the structure is not scheduled at this time.

The Main Street parking lot is the tentative site for the proposed multi-level parking structure.

The Missoula Redevelopment Agency also increased the CBD parking supply by constructing parking areas along the river front. The project includes altering the grade of Ryman Street south of Front Street, which is used as a primary access to the island parking area. At the completion of this project, which was completed in July 1986, the west island lot will provide 98 spaces and a park-like environment along the river front.

Another significant development in CBD parking is a shift in the long-term demand. The Parking Commission has increased the long-term "employee"

parking lots from approximately 250 leased spaces in 1980 to almost 800 in 1985. This shift in long-term demand combined with the newly-constructed surface lots has greatly improved the supply of short-term parking spaces. From the customer perspective, an additional 775 short-term spaces are now available that did not exist in 1980.

At present CBD shoppers can usually park within line-of-sight of their destination for the current rate of 25¢ per hour for short-term parking. The long-term "employee" parking rate is 25¢ per four hours; and in most cases, employees park within one and one-half blocks of work.

The most notable area in the CBD with a large parking deficiency is between Pattee and Washington Streets in the vicinity of the Federal Building. There is a need for additional short-term parking in this area to serve the Post Office and Forest Service as well as the other federal offices. Several of the large businesses in this area provide private off-street customer parking, but none is supplied for the Federal Building patrons.

The current Parking Commission projects in the CBD tend to address the maintenance and operation of the existing lots. Although a funding source had not yet been defined, the parking structure will most likely be the next major improvement to the system. A continuing effort by the Commission is made to achieve a better balance between long- and short-term parking demands. For the most part, the short-term needs are being adequately served while a shortage of long-term spaces still exists. The acquisition of additional properties to serve this need is reviewed periodically, but no land purchases are anticipated at this time.

C. Inventory of Physical Features

An inventory of the CBD transportation facilities was performed to document the existing conditions and to identify deficiencies. The street facilities were reviewed including right-of-way widths, pavement widths and condition, driveway entrances, and traffic signals. An update of the parking inventory was performed on a block-by-block basis indicating the current supply of on-street and off-street parking spaces. Pedestrian and bicyclist facilities were identified including sidewalks, crosswalks, pedestrian signals, bicycle rack locations, and wheel chair ramps. The results of this inventory are shown graphically in Figure 8. The Central Business District boundary is also shown on this figure. (Note that for the purpose of this update, the CBD is considered to be the area bordered by Washington and Orange Streets on the east and west by Railroad Street and the river on the north and south.) The data presented in this figure has been superimposed on an aerial photograph of the CBD taken in 1984 which shows the current configuration and circulation patterns of the surface parking lots.

The parking inventory consisted of a comparative evaluation of the parking facilities existing at the time of the 1980 Parking Development Program

Study and the present conditions. It should be noted the study area in the previous reports was smaller than the CBD area considered in this update. A block-by-block summarization of both off-street and on-street parking supplies for the years 1980 and 1985 is presented in Table No. 8. Blocks 1 through 26 were analyzed in the 1980 Development Plan, and the table lists a subtotal of the changes in parking supply occurring in the last five years within this area. The principal reason for the net increase in parking supply is the construction of six public off-street lots, one on Main Street between Higgins and Ryman and several private lots; the most notable being the new surface lot for the Sheraton Hotel and Convention Center at the south end of Pattee Street.

TABLE NO. 8

CBD PARKING INVENTORY

	Off-Street		On-Street		Total		Change
Block	1980	1985	1980	1985	1980	1985	1980-1985
1	76	108	33	36	109	144	+ 35
2	73	66	39	39	112	105	- 7
3	42	43	32	39	74	82	+ 8
4	66	64	57	50	123	114	- 9
5	22	13	51	50	73	63	- 10
6	35	108	50	51	85	149	+ 74
7	87	121	42	45	129	166	+ 37
8	33	32	63	63	96	95	- 1
9	52	50	42	40	94	90	- 4
10	54	50	46	42	100	92	- 8
11	39	61	27	44	66	105	+ 39
12	82	24	41	51	123	75	- 48
13,14,15	68	229	57	52	125	281	+ 156
16	173	171	12	25	185	196	+ 11
17	196	185	19	20	213	205	- 10
18	140	165	19	24	159	189	+ 30
19	82	41	46	49	128	90	- 38
20	7	26	45	54	52	80	+ 28
21	36	42	51	52	87	94	+ 7
22	70	84	36	60	106	144	+ 38
23	73	60	59	53	132	113	- 19
24	104	94	59	58	163	152	- 11
25	0	0	24	53	24	53	+ 29
26	7	7	42	41	49	48	- 1
Subtotal	1617	1844	992	1091	2609	2935	+ 326
27	-	20		35		55	
28	-	60	-	34	-	94	
29	-	22	-	33	-	55	
30	-	50	-	18	-	68	
31	-	40	-	34	-	74	
32	-	0	-	48	-	48	
33	-	34	-	33	-	67	
Total		2070		1326		3396	

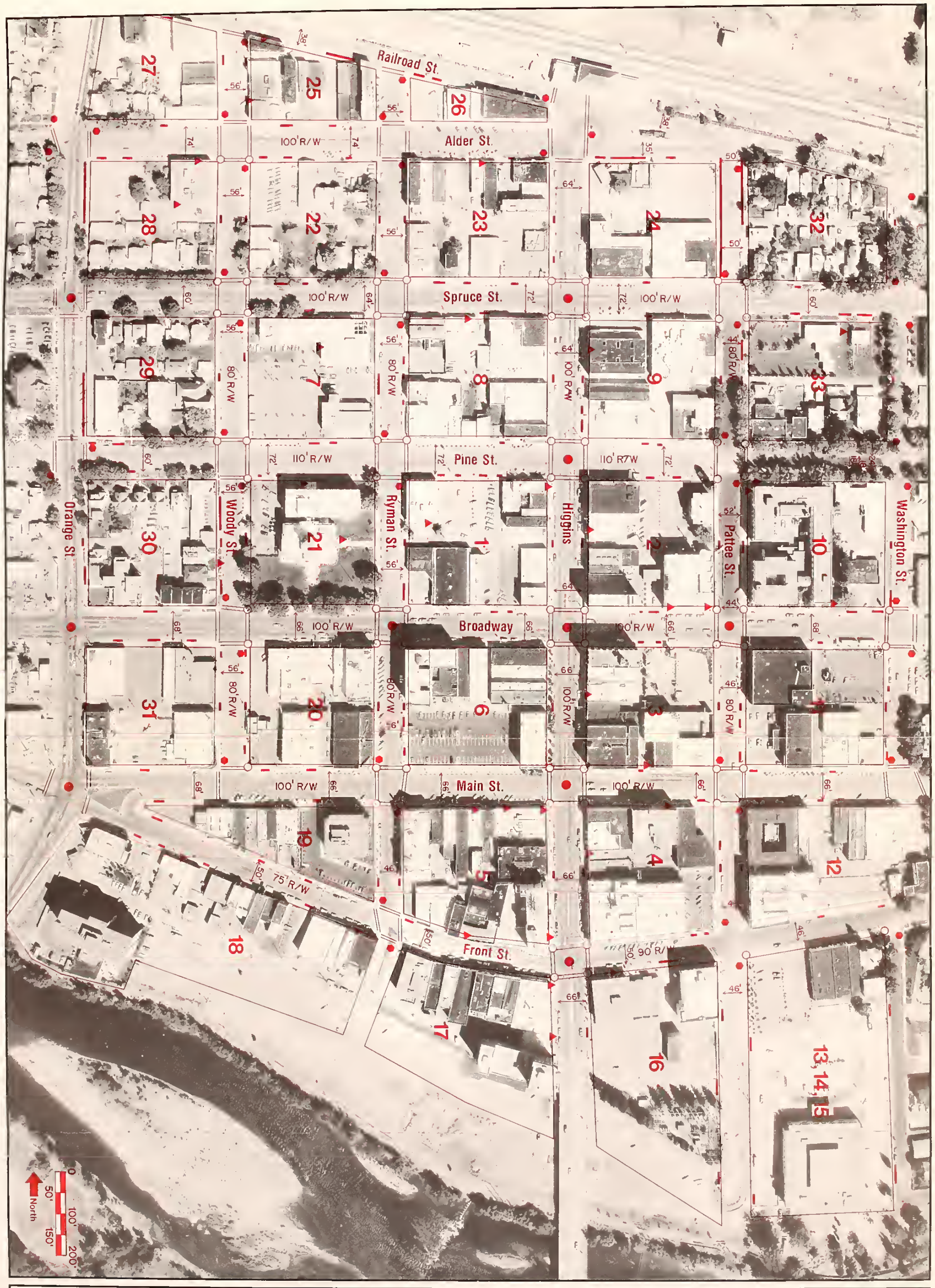


Figure 8
CBD Physical Inventory

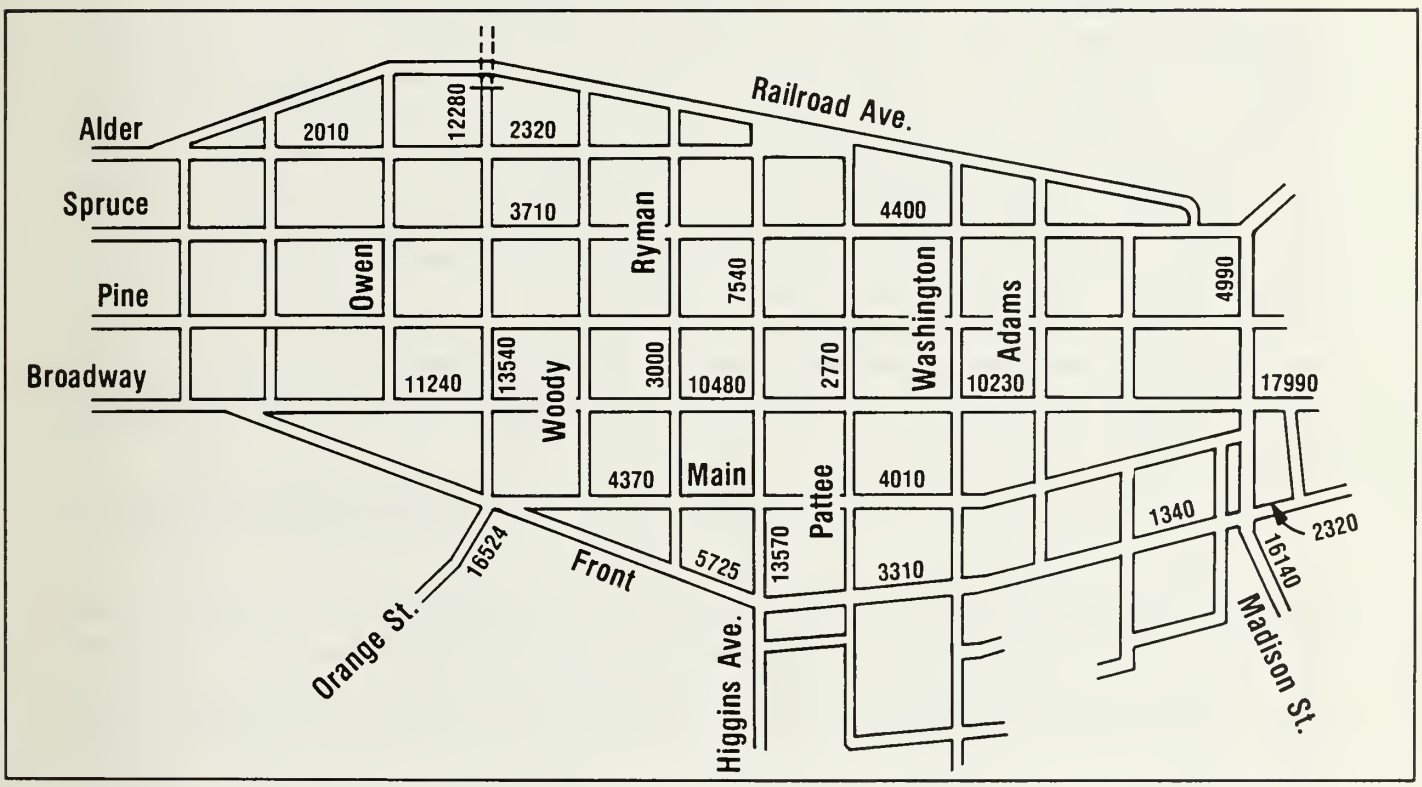
Photo Date, August, 1984

14 Block Number
Pedestrian Crosswalk
Right of Way Limit
Driveway Access
Signalized Intersection
Wheel Chair Ramp
Bike Rack
Stop Sign

D. Existing and Future Traffic Volumes

The traffic volumes on the major streets within the CBD are monitored by the City and the Department of Highways. Traffic surveillance counts recorded in 1985 were used to define the existing traffic conditions. The existing traffic volumes in the CBD are presented graphically in Figure 9.

Figure 9
Existing Traffic Within The C.B.D.
Based On 1985 Traffic Counts
(Volumes Represent Annual Average Daily Traffic)



Forecasting future traffic is typically provided through the use of the computerized traffic assignment model. Unfortunately, the Department of Highway model used for the purposes of this study is not sensitive enough to provide meaningful results on the minor streets within the CBD. The model does indicate that traffic volumes within the CBD will not increase significantly over the next 20 years. The only major changes are expected on Broadway and Higgins which will increase by approximately 5,000 VPD and 2,000 VPD, respectively. Although some redistribution of CDB traffic is anticipated as a result of these increases, the volumes on the other streets within the CBD will not change appreciably.

It should be noted these traffic forecasts are based on the fact that all other factors will remain relatively constant throughout the forecast period. For instance, if the Mountain Line bus system discontinued service in the Missoula area, traffic would increase on all of the downtown streets as well as increase parking demands. Other changes to the downtown area such as a shift away from retail business and toward banking and office space would affect the long- and short-term parking balance but would not produce a significant change in overall traffic volumes. It is assumed the current downtown redevelopment policies will continue to guide and support the needs of the CBD.

E. Pedestrian and Bicycle Activity within the CBD

The concentrated land use within the CBD encourages a certain amount of pedestrian traffic due to the location of available parking. The rest of the pedestrian traffic is a result of customers and employees circulating between restaurants, shops, and office buildings. Wide sidewalks, crosswalks, and pedestrian-activated traffic signals have been provided within the CBD for the foot traveler. The Consultant performed pedestrian and bicycle counts during the fall of 1984 at 11 CBD intersections in an effort to quantify and locate the areas of greatest pedestrian travel. Pedestrian and bicyclist volumes were recorded during six peak travel hours (7:00-9:00 a.m., 11:00 a.m.-1:00 p.m., 4:00-6:00 p.m.) during typical weekday operation. Three intersections were counted from 7:00 a.m. through 6:00 p.m. to provide data necessary to evaluate the daily fluctuations in pedestrian and bicycle volumes. The results of these studies indicate that, in the heart of the retail section of the CBD along Higgins Avenue, the pedestrian volumes tend to reach their highest levels from 11:00 a.m. through 4:00 p.m. In other areas of the CBD the peak period is much shorter, typically from noon to 1:00 p.m. The areas of highest pedestrian activity were determined to be along Higgins Avenue at the intersections of Broadway, Main and Front Streets and at the intersection of Broadway and Pattee. At these four locations pedestrian volumes typically exceeded 400 pedestrians per hour (ped/hr) during several hours of day with the highest hourly recording occurring at the intersection of Broadway and Higgins with 660 ped/hr.

According to the 1980 census, 6.8% of Missoula's work force travels by bicycle to their place of employment which is 14 times the national average. This figure does not include the additional bicycle traffic generated by University students. In an effort to meet this demand and encourage bicycle usage, the Missoula Redevelopment Agency has installed numerous bicycle racks through the CBD. These rack locations are shown on Figure 8.

Bicycle travel within the CBD tends to be more consistent throughout the day with the heaviest travel occurring between 4:00 and 6:00 p.m. Bicycle volumes appear to be uniformly distributed throughout the CBD with the highest concentrations occurring at the intersections of Front and Higgins and Orange/Front/Main. The highest bicycle volume was recorded at the Orange/

Front/Main intersection during the evening peak period with a volume of 40 bicycles per hour. It appears from the data that the high bicycle volumes recorded at these two intersections are due to their location with respect to the bridges over the Clark Fork River. Although relatively high bicycle volumes were recorded on portions of Orange Street and Higgins Avenue, it was noted that volumes tend to disperse quickly as the distance from the bridges increases. The data also indicates that the CBD bicyclist avoids the heavy vehicle volume streets such as Broadway while favoring streets with wide pavement sections, a good riding surface, and relatively low vehicle volumes such as Pine and Spruce Streets.

Both the pedestrian and bicycle volumes are greatly influenced by weather conditions and to an equal extent by the University students. From field observations, it is apparent that bicyclists are affected much more than pedestrians by inclement weather conditions. During the winter months, bicycle travel becomes difficult due to snow-packed and icy street conditions. Periods of greatest bicycle activity occur when the University is in session and the weather is pleasant. It should also be noted that the pedestrian volumes in the CBD, which are rather constant throughout the year, are greatly affected by the major shopping seasons and sales promotions by the CBD retail businesses.

The bicyclists appear to function well with the CBD vehicular traffic causing only minor disruptions while pedestrian volumes at major intersections can create significant vehicle delays.

F. Traffic Circulation

Access to the CBD is confined to a few major routes due to the Clark Fork River and the railroad tracks which have only limited crossings. Orange Street and Broadway carry the major through traffic flows and are the only two routes functionally classified as principle arterials within the CBD. Although Higgins Avenue is classified as a minor arterial, it provides a principle access function to the CBD. Due to the importance of these three routes, it is essential that they, above all other streets in the CBD, have efficient traffic flow characteristics. As it turns out, all of the signalized intersections within the CBD are located on these three corridors. As a result, the operation of the CBD traffic signals will tend to control the overall effectiveness of the street network in the CBD. Nine of the ten traffic signals in the CBD are pretimed, thereby allowing coordination of adjacent signal times to produce favorable traffic progressions on each route.

The one-way couplet consisting of Main and Front Streets, which are minor arterials, provides a major circulating function in the CBD. This one-way loop allows vehicles to traverse that portion of the CBD with the highest density of retail businesses and provides access to many of the public off-street

parking lots. The western terminous of the couplet at Orange Street functions well and provides an easy means for motorists to continue on the loop and re-circulate into the downtown area. The eastern end of the couplet on the other hand is difficult to negotiate and has only limited access to Madison Street. The low traffic volumes along the eastern portion of the couplet reflect the inability of this portion of the system to provide for the needs of the CBD motorists.

The intersection at Washington and Main presents a unique traffic circulation problem. The alignment of the north and south approaches on Washington are offset by approximately 100 feet, presenting a potential conflict for southbound traffic. A vehicle must turn left on Main against the flow of the one-way traffic in order to continue south. To alleviate this situation, the southbound left turn maneuver should be restricted through the use of a no left turn sign and pavement arrows.

There is one block of Front Street, between Ryman and Higgins, that is striped for two-way travel. This creates significant problems at the Front/Ryman intersection. At this intersection Front Street changes from one-way to two-way operation. Confusion on the part of the CBD motorist has been observed at this location in the form of vehicles traveling east in the west bound lane of Front Street. This one block of two-way traffic in the Main-Front one-way loop is undesirable from a continuity and safety perspective. The need for this sole two-way link should be reviewed and eliminated if possible. If the situation is to remain as is, additional striping and signing should be installing to better direct and channelize traffic.

Spruce Street is another route that allows traffic to traverse the length of the CBD efficiently. Spruce connects to Duncan Drive and Madison Street on the east end and intersects Orange Street to the west. The wide street section combined with a relatively low density of retail business creates a corridor that serves the function of moving cross town traffic as well as providing access to all the north-south arterials.

Other streets within the CBD that carry large volumes of circulating traffic are Ryman and Pattee. These links in the street network function as minor arterials and provide for the circulation of traffic around the heart of the CBD. These routes also provide access to several off-street parking lots as well as providing over 250 on-street parking spaces.

Making deliveries from the center of the street is a common practice in the CBD.

Several problems were identified through field observations and the studies performed that pertain to the traffic circulation in the CBD. A major disturbance to traffic flow is the presence of delivery vehicles which either double park or park in the center of the street. This is attributed to the lack of an effective alley network. Most alleys are too narrow for large trucks to negotiate and the alleys are not continuous from block to block. There is little provision for on-street loading zones and to provide additional zones would reduce the amount available on-street customer parking which is also in great demand.

Access to the off-street parking areas is generally good although high visibility signing of these lots may reduce confusion on the part of the CBD motorist. The island parking areas which supply a large percentage of the long-term employee parking has only limited access due to the location and topography. The primary access to the west island and Caras lots is on Ryman Street. Although the grade of Ryman Street, south of Front, is being altered as part of the Missoula Redevelopment Agency improvements to the island parking area, additional well defined points of access would increase usage of the lots and provide for better circulation.

Angle parking along the downtown streets is a popular and effective solution to the CBD parking deficiency problem. It should be noted that angle parking is only effective if adequate street width exists. On streets such as Pine and Spruce that have curb-to-curb street widths of 65 feet and greater, the presence of angle parking on both sides of the street has little effect on traffic. Missoula is fortunate that most streets in the CBD are wide enough to accommodate this type of parking arrangement. There are several streets in

the CBD that are too narrow to effectively handle angle parking without creating excessive friction on the vehicle traffic. Pattee Street is one in particular that cannot and should not have angle parking. Streets such as Ryman and Woody which have curb-to-curb street widths of 56 feet can adequately handle angle parking on one side of the street and parallel parking on the other. Several block lengths of these streets presently have parallel parking on both sides of the street. Alteration of the parking system on these blocks to angle parking on one side would create additional one-street spaces that are always in demand. In those cases it would be beneficial to provide all of the angle parking on, for instance, the east side of the street for the entire length of the street. This would lend itself to system continuity and reduce confusion on the part of those seeking parking spaces.

The area of the CBD that was identified as having a major deficiency of parking is in the vicinity of the Federal Building. One solution to this problem would be to remove the medians along Pine Street east of Pattee and provide angle parking on both sides of the street. The existing medians are 24 feet wide and force traffic to flow through narrow channels on either side of the median. During the winter months snow and ice accumulations intensify the need for wider travel lanes on this section of Pine Street. The existence of the medians on the east end of Pine Street are a major reason Pine is not playing a bigger part in the traffic circulation scheme of the CBD. The low traffic volumes on Pine reflect this fact. Most motorists circulating in the CBD avoid this portion of Pine unless absolutely necessary.

The intersection of Alder and Orange in the northwest corner of the CBD stands out as a potential problem. The grade of the railroad underpass limits the sight distance along Orange Street. Low traffic volumes on Alder at this location indicate that motorists tend to avoid this potential problem and choose to access or cross Orange Street at the Spruce Street intersection. The current needs for access at this location along Orange Street should be re-examined and, if possible, access at this location should be restricted to right turn movements only.

Traffic flow characteristics within the CBD could be improved through the elimination of unnecessary curb cuts. Access to and from the public street should be carefully located, preferably mid-block. Driveways located within 50 feet of the corner typically cause friction problems for the through traffic flow and can have a significant effect on the operation of adjacent intersections. All driveway entrances should be reviewed periodically; the unnecessary curb cuts removed and those that create safety and delay problems relocated.

Chapter IV: Public Transit Systems

A. Metropolitan Bus System

In June of 1976 Missoulians voted by referendum to establish the Missoula Urban Transportation District (MUTD). The district was organized in order to provide public transportation for residents of the district, offer an energy conservation alternative, and to improve air quality in the Missoula area. The bus system, the Mountain Line, began operation in December of 1977 and has grown steadily to meet the transit demands of the Missoula urban area.

The Mountain Line fleet consists of 21 buses operating daily on 13 fixed routes. The service area includes the communities of Bonner, Milltown, and East Missoula as well as the Missoula County Airport, the Frenchtown Mill, and most of Missoula's suburban residential areas. Bus service is generally available from 6:00 a.m. to 6:30 p.m. on weekdays and 10:00 a.m. to 6:00 p.m. on Saturdays. Bus frequency is generally 30 minutes during peak periods and 60 minutes during midday and Saturdays. The Mountain Line has had an annual ridership of approximately 600,000 persons since 1980. The bus system is funded primarily through a local property tax supplemented by farebox revenues and UMTA operating assistance grants. Current bus fare is 40 cents with senior citizens riding for only 20 cents.

The CBD transfer location where all bus routes converge is located on Main Street between Pattee and Higgins next to the Mountain Bell Building. This downtown "meet" poses several problems to the bus system and its passengers. Most notable of these are problems relating to bus safety and maneuverability. At the present location buses often double park and are required to merge in and out of the traffic flow on Main Street frequently creating a congested situation. The transfer location does not provide any weather protection for bus passengers and due to the on-street loading system, the patrons are also subjected to the hazards associated with exposure to the vehicular traffic on Main Street.

A CBD passenger terminal feasibility study was prepared for the MUTD in 1984. This study evaluated the current transfer location and considered the feasibility of constructing an off-street transit center. The tentative location of the proposed transfer location is on Pine Street between Higgins and Pattee. The new facility would provide shelter for passengers and alleviate many of the problems associated with the present "meet" location.

The Mountain Line is expected to keep pace with the future transit demands of the Missoula area. It is anticipated that new routes will be established to serve the Grant Creek and Lolo residential areas at such time as transit demand justifies the routes and funding sources are available. Adjustments to the existing routes are likely based on seasonal variations in

ridership. Bus usage is greatest during the winter months while ridership drops to approximately half the winter level during the summer months.

B. Specialized Transportation System

The Missoula Urban Transportation District established a specialized bus service for the handicapped and disabled in 1981. The Missoula Specialized Transportation System (MSTS) is administered by MUTD which subcontracts the actual bus system operation. The present subcontractor is Missoula's Arrow Medical Service. The special transportation system consists of four specially equipped buses which operate on a dial-a-ride basis. The system is available from 8:00 a.m. to 5:00 p.m. weekdays and 9:00 a.m. to 4:00 p.m. on Saturdays. The system serves the entire Missoula urban area as well as some portions of Missoula County. The current cost to ride the MSTS is 50 cents.

This system provides a very necessary function in the Missoula community and has an annual ridership of approximately 24,000. MUTD has indicated that there is a great demand for this type of service in Missoula and hopes to expand the system as funding becomes available.

C. Regional Bus Lines

Missoula is served by four bus lines at this time which all operate out of a central terminal located on West Broadway near the intersection of Mullan Road. Until October of 1984 the terminal was located in the CBD near Broadway and Higgins. The move to the new facility was prompted by a need for a more efficient and economical operation as well as a demand for more passenger parking.

A brief description of passenger/parcel service provided by each bus line is outlined below:

Intermountain Bus Line	Provides the most routes to cities and towns within Montana making connections to most major metropolitan areas in the Rocky Mountain region.
Greyhound Bus Line	Operates an east-west route through Montana making interstate connections from Seattle to Chicago.
Rimrock Stage	Provides a single shuttle route between Missoula and Helena.

Bitterroot Stage	Manages a single route which serves the communities along the Bitterroot Valley making connections in Salmon, Idaho.

D. Taxi Service

Although there are two taxicab companies licensed to service the Missoula area, they are both privately owned and operated by Mr. Bob Gray. The Yellow Cab and Deluxe Cab Companies act jointly and are locally known as Yellow Cab Inc. The taxi operation consists of seven cabs which operate within a 50 mile radius of Missoula and are available 24 hours a day, seven days a week. The Yellow Cab Company has been serving Missoula for the past 30 years.

E. Air Service

The Missoula County Airport, known as Johnson-Bell Field, provides for all commercial and general aviation travel in the Missoula area. The airport currently accommodates approximately 160 privately-owned aircraft. The airport is also the location of the U.S. Forest Service Aerial Fire Depot which serves western Montana aerial firefighting and fire rescue operations. The major air carriers which provide commercial passenger service at the airport are Delta, Continental, Northwest Airlink, and Big Sky Airlines. The volume of passengers enplaned on commercial airlines at the Missoula Airport was approximately 117,000 in 1985 and is forecast to increase to 250,000 passengers by the year 2005. Approximately 4,400 commercial airline departures were performed at Johnson-Bell Field in 1985 and is expected to increase to 6,250 by the year 2005.

The primary vehicular access to the airport is via U.S. Highway 10. Traffic circulation within the airport facility is provided by a one-way loop that widens to four lanes in front of the terminal building. In this area the curb lane is reserved for loading and unloading passengers while the other lanes are for maneuvering and through traffic. The airport parking facilities include 85 short-term and 204 long-term parking spaces for passengers, 69 employee spaces as well as 137 parking spaces for airport rental car companies. Additional access to the airport directly from Interstate 90 has been considered and evaluated as part of this Transportation Plan Update.

F. Rail Service

Since the discontinuation of the National Rail Passenger Corporation (Amtrak) in October of 1979, there has been no passenger train service in Missoula. Freight service is still provided by the Burlington Northern Railroad. Resumption of passenger service is not likely in the foreseeable future.

G. Future Developments in Public Transit

The present transit needs of the Missoula area are being adequately addressed for the most part. Bus service through the Mountain Line is responsible for the majority of the transit travel in the area and is very effective. The overall effectiveness of the vehicle transportation system and the area's parking systems would be in jeopardy without public transit. As the population of the Missoula urban area increases so will the emphasis on public transportation.

The future of Missoula's public transportation system cannot and most likely will not be met by the current Mountain Line operation. Alternatives to the present fixed route bus service will be necessary to serve the outlying residential areas that will be developed in the future. Park and ride commuter bus travel during peak weekday periods would be beneficial in addressing these needs. Van-pooling for employees by some of the major businesses such as the Frenchtown Mill and Champion International in Bonner should be encouraged. The major employees within the urban area and especially the CBD could relieve some of the long-term parking needs of the area through emphasis of car-pooling by employees. The employers housed by the Federal Building in the CBD could have a dramatic effect on localized traffic and parking problems through van-pooling and car-pooling.

The University which is a major generator of traffic circulation and parking problems could achieve substantial relief by increasing the campus parking fees and and establishing commuter parking lots and an inexpensive commuter shuttle bus system.

As mentioned previously in this chapter, there is a great demand for an expanded dial-a-ride service for the handicapped and elderly.

Through better public awareness and the proper incentives, many of these programs can be created. Public transit is off to a great start in Missoula through the Mountain Line and the other public transportation systems, but it is only a start. To insure the benefits of mass transit, Missoula's employees must play a bigger role in the promotion of the transit alternatives. Through a cooperative effort by those who work and shop in Missoula, public transportation can be a significant solution to the problems the community will face in the future.

Chapter V: Transportation System Management Plan

A. Methods and Procedures

The Transportation System Management (TSM) concept emphasizes the implementation of many localized improvements to increase the effectiveness and safety of the existing street network. The focus of this management plan is to identify possible alterations and/or operational changes to the transportation system that will improve traffic flow characteristics by eliminating the minor bottlenecks that limit the performance of the entire system. Locations identified through an accident analysis as hazardous were also examined for possible corrective measures that will result in fewer accidents.

A variety of traffic studies were done for this Transportation Plan Update as described in Chapter II. These studies provided the necessary field data to identify problem areas and system deficiencies. The studies revealed a number of weaknesses in the system and highlighted areas where minor improvements would improve traffic operations. On the basis of these studies and knowledgeable input from the Transportation Advisory Committee and City and County Engineering personnel, a list of recommended transportation system management improvements was developed.

Due to current economic conditions, many urbanized areas are finding it necessary to spend the majority of their limited local funds on maintenance improvements and are not able to fund many capital improvements. Since most federal aid funds are utilized to finance Missoula's major improvement projects, it is anticipated that most of the TSM improvements will be funded out of local gas tax revenues. The local governing bodies may have to examine additional funding sources to finance all of the recommended TSM improvements.

B. Traffic Signal System Evaluation

Generally, traffic moves quite well under current volumes except for a few isolated problem areas which are discussed in Section C of this Chapter. A good measure of the quality of travel in an area is the average travel time over a particular route and the amount of stopped time at each major intersection. In most cases, travel times across the city were less than 15 minutes even during peak travel periods, with individual stopped delay rarely exceeding one minute. The exceptions to this are at South/Brooks/Russell, South/ Reserve, and South Third West/ Reserve.

An examination of the existing signal facilities indicated several deficiencies. Many of the signalized intersections are equipped with signal controller units that are 20 to 25 years old and at the end of their useful service life. These controllers, which would typically have high maintenance costs, should be replaced with new equipment which will have much more

versatility and reliability. A number of controllers are obsolete with regard to ability to coordinate and should be replaced.

Traffic detector loops, which are electronic circuits placed in the asphalt on intersection approach lanes, enable the signal to allocate green time according to actual traffic demand. At the time of inspection, several signal detectors were inoperable. Proper detection combined with efficient time settings is essential when attempting to move traffic effectively.

A common maintenance problem identified at several signalized intersections is signal head visibility. Typically, tree branches obscure the driver's view of the signal. Another related problem is the conflict with roadside commercial advertisements. In many instances the visual effect of the traffic signal is compromised by the overpowering commercial signs.

One method of improving traffic signal operation is to coordinate the operation of a series of signals along a corridor. Coordinated operation requires installation of an interconnect circuit and a master controller. Typical signal systems provide coordinated operation plans for morning and afternoon peak hours and off-peak hour traffic demands. Signal coordination between intersections is very desirable with respect to corridor flow characteristics. At present several segments of the signal system are coordinated and are listed below:

- Higgins Street signals (five) within the CBD
- Broadway intersections at Ryman, Higgins and Pattee
- Orange Street intersections at Main Street and Broadway
- Higgins Street intersections at Fourth, Fifth, Sixth, and Brooks
- Orange Street intersections at Third, Fifth, and Sixth Streets

Other corridors would benefit from coordinated signal operation such as the intersections along Higgins Street south of the river which should be interconnected with the coordinated segments of Higgins Street north through the CBD. The intersections on Russell Street at Third and Fifth Streets as well as the intersections on Broadway at Madison and Van Buren Streets should be interconnected to provide more efficient operation. The spacing of traffic signals is a major factor in the effective operation of a coordinated signal system. A general recommendation is to interconnect signals when average signal spacing is one-half mile or less.

Coordination of signalized intersections can be accomplished through a variety of methods such as time base coordination, which utilizes synchronized time blocks, or a hardwire buried circuit or an overhead telephone link. Coordination of these signals can be achieved through the use of on-street master controllers or through a more versatile central master controller. The central master typically consists of a software package, a personal computer, a monitor, and printer. This type of system with hardwire or telephone interconnects

to the signalized intersections enables technicians to monitor signal operation and traffic variations and allows for adjustment of signal timings or phasing from a central location.

As intersection reconstruction projects occur, existing signal controller units should be examined with respect to the desired operation and be replaced if the intersection needs cannot be handled by current equipment. Typically, existing controller hardware should be replaced with eight-phase fully actuated controllers for intersections outside the CBD. All new traffic controllers are microprocessor based which allows the units to provide many service functions such as multiple timing plans, time base coordination, as well as hardwire interconnects. The eight-phase controller systems provide the greatest flexibility with respect to signal phasing allowing for leading or lagging turn phasing and multiple overlap phasing. The installation of a new eight-phase controller insures that the signal will be responsive to the fluctuations and growth of traffic volumes in the future.

As a general comment, where practical it is recommended to always install conduit along a roadway during reconstruction or utility relocation. In this way hardwire interconnects will be available in the future when coordinated signal operation is desired.

Signal timing and the optimization of existing equipment can result in increased capacities and improved traffic flow. Aggressive timings and effective loop detection can result in a 10% to 20% increase in signal efficiency. It is recommended an areawide signal maintenance program be established whereby all signals would receive a periodic inspection (twice a year) by a qualified signal specialist. During the inspection, signal timings would be adjusted to match current traffic demands and the signal hardware checked and maintained including detector loops, pedestrian activation equipment, and the signal head themselves. These mechanical devices ultimately control the efficiency of the entire system. Money expended on proper maintenance of this equipment is the cheapest improvement that can be made at an existing signalized intersection.

As a general policy, all signalized intersections should be reviewed periodically to determine if the signal warrants are still met. If not, the signal should be removed and a form of stop sign control used.

As the urban area continues to grow, several additional intersections will require signalization. As corridor volumes increase, the present stop sign control system will no longer provide adequate service. Over the next 20 years the following intersections will most likely meet the volume signal warrants and are considered desirable future signal locations:

- Higgins/Mount/Beckwith
- Higgins/Pattee Canyon Road
- South/Stephens

- South/Bancroft
- Reserve/Mount
- S.W. Higgins/Stephens/High Park Way
- 39th/23rd/Dore

It should be noted this list of intersections is based solely on the satisfaction of the volume warrants. It is recognized that other locations may require signalization due to other factors such as pedestrian traffic or accident history. As future signal needs become more apparent at these locations and other intersections identified in the future, improvements and roadway reconstruction in the vicinity should be done with signalization in mind. Through prior planning, the cost of signalizing an intersection can be minimized and, through proper geometric planning, the future intersection will function more efficiently.

C. Recommended Improvements

A listing of the committed and recommended TSM improvements is shown in Table No. 9 and presented graphically on Figure 10. A brief description of the committed improvements is presented in Chapter I of this document while further information on the recommended improvements is provided in Appendix A. Included in this information is an estimated project cost based on 1985 construction costs. The Montana Department of Highways' bid tabulations were the basis for the unit prices used in the development of these figures. Possible funding sources for each TSM improvement are also provided.

TABLE NO. 9

COMMITTED AND RECOMMENDED TSM IMPROVEMENTS

Location	Recommendation	Estimated Cost	Maintenance Jurisdiction	Possible Funding Source
Committed TSM Improvements				
A. Reserve Street south of 7th	Widen Canal Bridge to provide sidewalks	$ 5,500	County	County Bridge Fund
B. South & Schilling	Widen Canal Bridge	5,000	County	County Bridge Fund
C. South Ave. (38th to Reserve)	Right-of-way acquisition for a walkway/bikeway	30,000	County	County Road Fund
D. State route improvements on: Van Buren - I-90 to City Limits Orange - Stephens to Broadway Russell - Mount to 3rd Russell - South Ave. to Mount Higgins - Daly to Mount South - Regent to Bancroft	Street reconstruction and/or pavement overlay	200,000	City (S.C.)*	State Mtce. Funds
E. Street reconstruction program: Toole - Broadway to Scott	Street reconstruction and pavement overlay, curb and gutter on some portions	100,000	City	City Gas Tax Fund
F. Van Buren St. Interchange	Rehabilitation of Irrigation Sprinkler System	35,000	State	Interstate 4R Fund
Total Committed TSM Improvements		$ 375,500		
Recommended TSM Improvements				
1. Mullan Rd. (Reserve to Flynn Lane)	Shoulder widening	$ 80,000	County	FAS Fund County Road Fund
2. Mullan Rd. (MP 2.9 - 3.1)	Signing	2,600	County	FAS Fund County Road Fund Safety Fund
3. Mullan Rd. (MP 2.0 - 2.2)	Signing, delineation	750	County	FAS Fund County Road Fund Safety Fund

*S.C.: State Contract; City maintains state highway through state maintenance contract.

TABLE NO. 9 (CONT.)

COMMITTED AND RECOMMENDED TSM IMPROVEMENTS

	Location	Recommendation	Estimated Cost	Maintenance Jurisdiction	Possible Funding Source
4.	Mullan Rd. (MP 0.9 - 1.1)	Signing	860	County	FAS Fund County Road Fund Safety Fund
5.	Reserve & Mullan	Signing, brush removal	2,000	City County	FAS Fund County Road Fund City Gas Tax Fund
6.	Reserve St. Bridge over Clark Fork	Mill bridges decks and approaches	23,300	County	FAU Fund County Bridge Fund Safety Fund
7.	W. Broadway & Mullan	Guidance signing	530	City (S.C.)*	City Gas Tax Fund
8.	Broadway & Russell	Geometric and signal improvements	36,000	City (S.C.)*	FAP Fund State Mtce. Funds
9.	Russell St. Bridge	Plan for bike lanes in future bridge designs	--	--	--
10.	Broadway (Flynn to RR Tracks)	Install street lighting	695,000	City (S.C.)*	FAP Fund State Mtce. Funds
11.	Scott, Toole, Spruce	Geometric changes	46,500	City	City Gas Tax Fund FAU Fund
12.	Worden, Stoddard, No. 5th	Install median islands	1,900	City	City Gas Tax Fund FAU Fund
13.	Orange St. Underpass	Adjust drain grates	2,900	City (S.C.)*	State Mtce. Funds City Gas Tax Fund FAU Fund
14.	Orange & Alder	Right turn only restrictions on Alder - using raised medians	5,600	City (S.C.)*	State Mtce. Funds FAU Fund
15.	Orange - Main - Front	Lane use changes on west approach	2,100	City (S.C.)* City	State Mtce. Funds City Gas Tax Fund FAU Fund
16.	Orange St. Bridges	Provide bike lanes in future designs	--	--	--

*S.C.: State Contract; City maintains state highway through state maintenance contract.

TABLE NO. 9 (CONT.)

COMMITTED AND RECOMMENDED TSM IMPROVEMENTS

	Location	Recommendation	Estimated Cost	Maintenance Jurisdiction	Possible Funding Source
17.	Pine St. (Woody to Ryman)	Pedestrian crossing	3,500	City	City Gas Tax Fund MRA
18.	Main & Ryman	Sight distance improvements on SE corner	450	City	City Gas Tax Fund MRA
19.	Front & Ryman	Sight distance improvements on NW corner	550	City	City Gas Tax Fund MRA
20.	Main - Front One-Way Couplet	Lane use pavement markings	6,400	City	City Gas Tax Fund MRA
21.	W. Island & Caras Parking Lots	Plan for more access to parking area	--	--	--
22.	Higgins St. (Front to Spruce)	Signal improvements	8,500	City (S.C.)* City	State Mtce. Funds City Gas Tax Fund MRA FAU Fund Safety Fund
23.	Pine St. Medians (east of Pattee)	Removal of medians	163,000	City	City Gas Tax Fund MRA
24.	CBD Delivery System	Delivery restrictions through city ordinances	--	--	--
25.	CBD On-Street Parking	Parking layout modifications on Woody, Ryman, Pine, and Spruce	33,300	City	City Gas Tax Fund MRA
26.	Greenough Hill	Curve realignment	6,200	City	City Gas Tax Fund
27.	Broadway & Madison	Geometric and signal improvements	23,900	City (S.C.)*	FAP Fund State Mtce. Funds
28.	Front & Madison	Bike crossing	2,400	City (S.C.)*	State Mtce. Funds
29.	E. Broadway (½ block east of Van Buren)	Install street lighting	15,400	State	FAU Fund State Mtce. Funds
30.	E. Broadway & I-90	Signing	3,900	State	State Mtce. Funds Safety Fund FAU Fund

*S.C.: State Contract; City maintains state highway through state maintenance contract.

TABLE NO. 9 (CONT.)

COMMITTED AND RECOMMENDED TSM IMPROVEMENTS

	Location	Recommendation	Estimated Cost	Maintenance Jurisdiction	Possible Funding Source
31.	I-90 - E. Missoula Int.	Access ramp realignment	19,000	State	Interstate 4-R Fund
32.	S. 3rd & Clements	Signing and roadside improvements	17,400	County	County Bridge Fund County Road Fund Safety Fund
33.	S. 3rd & Tower	Roadside improvements	21,400	County	FAU Fund County Road Fund County Bridge Fund
34.	S. 3rd & Reserve	Widen east, west and south approaches, includes new box culvert	83,000	City County	FAU Fund City Gas Tax Fund County Road Fund County Bridge Fund
35.	S. 3rd & Catlin	Pedestrian crossing and sidewalk	3,900	City (S.C.)*	State Mtce. Funds
36.	Russell St. Underpass	Construct surface ped/bike crossings	10,800	County	County Road Fund
37.	4th & Walnut	Install stop signs on Walnut	450	City	City Gas Tax Fund
38.	3rd & Orange	Widen north and south approaches	15,500	City (S.C.)*	FAU Fund State Mtce. Funds
39.	Stephens & Orange	Signing	15,800	City (S.C.)*	FAU Fund State Mtce. Funds
40.	Stephens (Orange to Mount)	Raised channelization along roadway shoulder	88,500	City (S.C.)*	FAU Fund State Mtce. Funds
41.	Stephens (Orange to Brooks)	Install street lighting	242,000	City (S.C.)*	FAU Fund State Mtce. Funds
42.	Higgins (3rd to Brooks)	Peak hour parking restrictions	2,600	City (S.C.)*	State Mtce. Funds
43.	6th & Higgins	Signal improvements	20,900	City (S.C.)*	FAU Fund State Mtce. Funds
44.	6th & Maurice	Signing, striping and parking restrictions	7,500	City (S.C.)* City	State Mtce. Funds City Gas Tax Fund

*S.C.: State Contract; City maintains state highway through state maintenance contract.

TABLE NO. 9 (CONT.)

COMMITTED AND RECOMMENDED TSM IMPROVEMENTS

Location	Recommendation	Estimated Cost	Maintenance Jurisdiction	Possible Funding Source
45. 5th & Maurice	Geometric improvements	5,900	City (S.C.)* City	State Mtce. Funds City Gas Tax Fund
46. Eddy & Ronald	Install stop signs on Ronald	450	City	City Gas Tax Fund
47. S. 7th & Reserve	Signing	550	County	County Road Fund
48. Reserve & Spurgin	Sight distance improvements and guard rail modifications	2,700	County	County Road Fund County Bridge Fund
49. 10th & Garfield	Install stop signs on Garfield	450	City	City Gas Tax Fund
50. 14th & Johnson	Sight distance improvements	2,050	City	City Gas Tax Fund Safety Fund
51. Russell (South to Broadway)	Plan for bike lanes in future designs	--	--	--
52. Mount/Edith/Harlem	Signing	335	City	City Gas Tax Fund
53. Mount/Park/Franklin/Plymouth	Geometric improvements	15,300	City	City Gas Tax Fund
54. Higgins/Beckwith/Hill/Mount	Geometric improvements	166,000	City (S.C.)* City	State Mtce. Funds City Gas Tax Fund FAU Fund
55. Ronald & Evans	Install stop signs on Ronald	450	City	City Gas Tax Fund
56. North & Russell	Parking restrictions and lane use markings on west approach	400	City (S.C.)* City	State Mtce. Funds City Gas Tax Fund
57. South & Reserve	Widen east and west approaches	22,900	County	FAU Fund County Road Fund
58. South (Russell to Reserve)	Plan for bike lanes in future designs	--	--	--
59. South & Johnson	Approach widening	23,000	County	County Road Fund

*S.C.: State Contract; City maintains state highway through state maintenance contract.

TABLE NO. 9 (CONT.)

COMMITTED AND RECOMMENDED TSM IMPROVEMENTS

	Location	Recommendation	Estimated Cost	Maintenance Jurisdiction	Possible Funding Source
60.	South & Garfield	Restripe north and south approaches	550	City	City Gas Tax Fund
61.	South & Stephens	Restripe approaches and four-way stop	950	City (S.C.)* City	State Mtce. Funds City Gas Tax Fund
62.	South & Bancroft	Restripe approaches and parking restrictions	1,800	City (S.C.)* City	State Mtce. Funds City Gas Tax Fund
63.	South & Higgins	Modify east and west approaches	18,600	City (S.C.)	State Mtce. Funds FAU Fund
64.	South & Arthur	Geometric improvements	14,200	City	FAU Fund City Gas Tax Fund
65.	Brooks & Reserve	Stripe right turn lane on east approach	100	City (S.C.)	State Mtce. Funds
66.	Brooks (Dixon to Clark Fork Bridge)	Install street lighting	333,500	State	FAP Fund City Gas Tax Fund
67.	Brooks & Harve	Parking restrictions on Harve	225	City	City Gas Tax Fund
68.	39th St. (Russell to U.S. 93)	Widen shoulder on north side	42,300	City County	City Gas Tax Fund County Road Fund FAU Fund
69.	Reserve & 39th	Widen east and west approaches	8,000	County	FAU Fund County Road Fund
70.	23rd, Dore, 39th	Restrict parking, widen east and west approaches, restripe north and south approaches	16,800	County	FAU Fund County Road Fund
71.	SW Higgins/Stephens/High Park Way	Striping and signing	950	City (S.C.)* City	State Mtce. Funds City Gas Tax Fund
72.	SW Higgins & Bancroft	Widen east and west approaches, restripe and restrict parking on north approach	8,300	City (S.C.)* City	State Mtce. Funds City Gas Tax Fund FAU Fund

*S.C.: State Contract; City maintains state highway through state maintenance contract.

TABLE NO. 9 (CONT.)

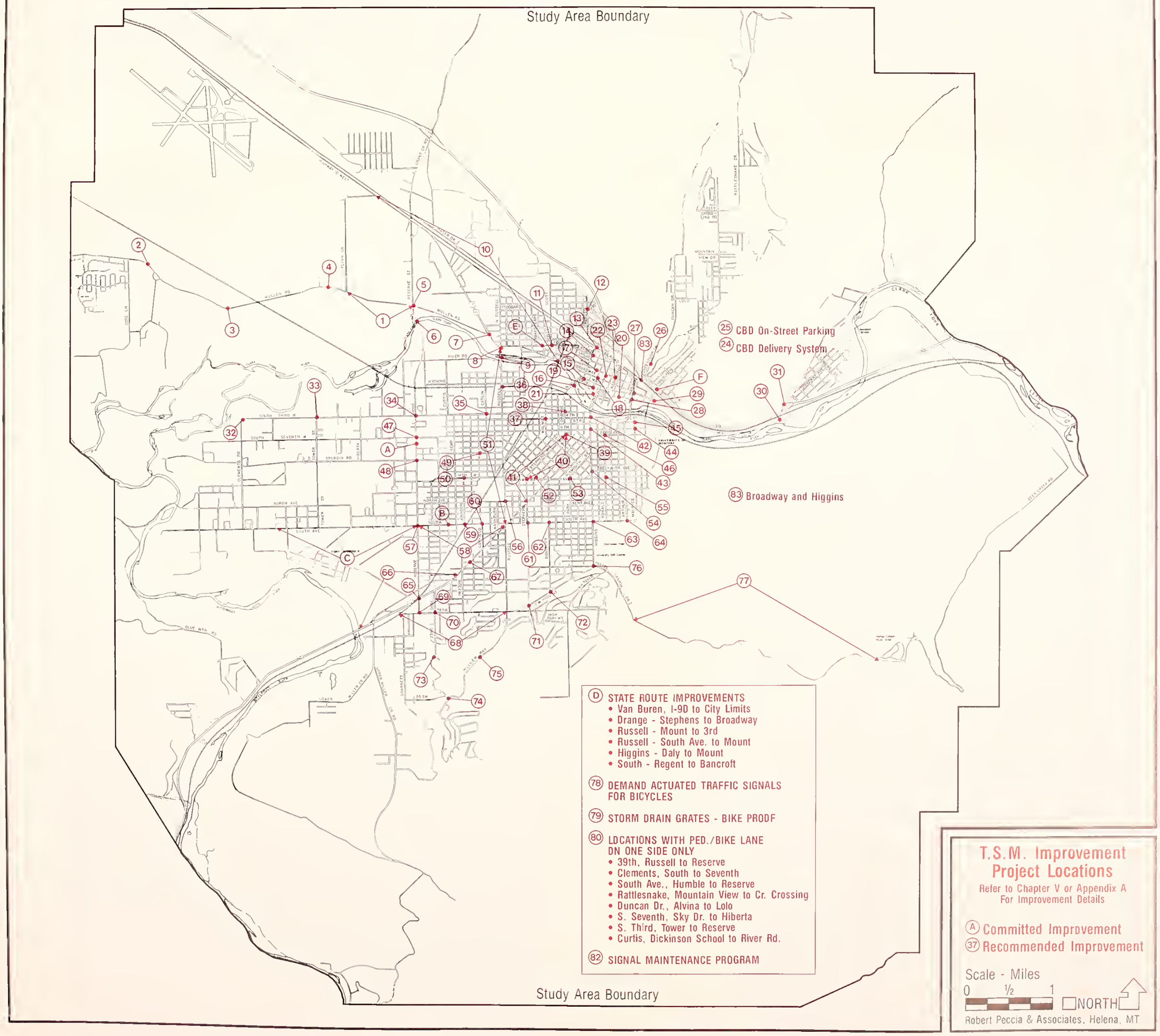
COMMITTED AND RECOMMENDED TSM IMPROVEMENTS

Location	Recommendation	Estimated Cost	Maintenance Jurisdiction	Possible Funding Source
73. 23rd St.	Stripe ped/bike lanes	800	City County	City Gas Tax Fund County Road Fund
74. 55th & Hillview Way	Signing and parking restrictions	1,800	City	City Gas Tax Fund
75. Hillview Way	Plan for sidewalks and bike lanes in future designs	--	--	--
76. Higgins & Pattee Canyon Rd.	Realign Pattee Canyon Rd. so it intersects Higgins at Sentinel Ave.	193,000	City (S.C.)* City	State Mtce. Funds City Gas Tax Fund FAU Fund
77. Pattee Canyon Rd.	Tree and brush removal, signing, delineation, widen south shoulder	120,000	County	FAS Fund County Road Fund Safety Fund
78. Demand activated signals	Identify detector loops for bikes on pavement at signals where used	1,500	City (S.C.)*	State Mtce. Funds
79. Storm drain grates	Bike proof grates	2,500	City (S.C.)*	State Mtce. Funds
80. Locations with ped/bike path on one side only	Restripe roads to provide equal shoulder widths	3,000	County	County Road Fund City Gas Tax Fund
81. Greenough Road Railroad Crossing	Install new crossing signals with crossing gates	175,000	City	Rail-Highway Crossing Fund
82. Signal maintenance program on all signalized intersections	Signal maintenance program	11,000/yr.	City (S.C.)* City	State Mtce. Funds City Gas Tax Fund
83. Broadway & Higgins	Signal modifications for left turn bays	53,000	City (S.C.)*	State Safety Funds
Total Committed Projects:		$ 375,500		
Total Recommended Projects:		$2,953,650**		
Total TSM Program:.		$3,329,150**		

*S.C.: State Contract; City maintains state highway through state maintenance contract.

**Does not include $11,000/yr. cost of signal maintenance program (TSM 82).

Figure 10: T.S.M. Improvement Project Locations


Study Area Boundary
25 CBD On-Street Parking
24 CBD Delivery System
83 Broadway and Higgins
D STATE ROUTE IMPROVEMENTS
• Van Buren, I-9D to City Limits
• Drange - Stephens to Broadway
• Russell - Mount to 3rd
• Russell - South Ave. to Mount
• Higgins - Daly to Mount
• South - Regent to Bancroft
78 DEMAND ACTUATED TRAFFIC SIGNALS FOR BICYCLES
79 STORM DRAIN GRATES - BIKE PRODF
80 LOCATIONS WITH PED./BIKE LANE DN ONE SIDE ONLY
• 39th, Russell to Reserve
• Clements, South to Seventh
• South Ave., Humble to Reserve
• Rattlesnake, Mountain View to Cr. Crossing
• Duncan Dr., Alvina to Lolo
• S. Seventh, Sky Dr. to Hiberta
• S. Third, Tower to Reserve
• Curtis, Dickinson School to River Rd.
82 SIGNAL MAINTENANCE PROGRAM
Study Area Boundary

T.S.M. Improvement Project Locations

Refer to Chapter V or Appendix A For Improvement Details

(A) Committed Improvement

(37) Recommended Improvement

Scale - Miles

0 ½ 1

NORTH

Robert Peccia & Associates, Helena, MT

Chapter VI: Major Network Improvements

A. Methods and Procedures

Major street network improvements are those improvements that will significantly alter the characteristics of a segment of the roadway system. These improvements are typically considerably more expensive than the TSM type due to the magnitude of the projects.

The system deficiencies described in Chapter II of this report were used to determine appropriate recommendations for the major street network. Through the various traffic studies and travel forecasting techniques, both current and future transportation problem areas were identified. Those system deficiencies that could not be properly addressed with TSM type improvement and requires a major change in the network are discussed in this chapter. Improvements recommended in the previous Transportation Plan and other pertinent studies were reviewed to assess which improvements were still applicable. This process resulted in a list of major improvement projects that address current and anticipated deficiencies in the system. Through the use of the traffic assignment model, those improvements that lent themselves to testing on the computer were modeled to determine the effect on the system. These improvements were then reviewed with the Technical Advisory Committee, and tentative priorities for improvements established.

B. Recommended Improvements

The ranking shown is intended to be a general guide and not an inflexible order of improvements. It is recognized that funding availability and other factors such as right-of-way acquisition will require adjustment in this ranking.

The major network improvements committed to by local government are included at the beginning of the list to permit a comprehensive view of the improvements proposed.

Descriptions of the committed and recommended major network improvements are as follows (see Figure 11).

Committed Improvement "A" - Reserve Street, South Third West to U.S. 93, M-8103(4)

This project consists of the reconstruction of Reserve Street to a four-lane facility. The proposed roadway section is 82 feet wide and includes four 12-foot driving lanes; a 14-foot median; two ten-foot shoulders; and new curb, gutter, and sidewalks. Major intersection improvements will be made at

the Brooks, South, and South Third intersections including approach lane widening, improved signalization, and intersection lighting. This project, which includes right-of-way acquisition, is scheduled for construction in 1991.

Estimated Project Cost: $8,335,214

Funding Source: Federal Aid Urban Funds

Committed Improvement "B" - South Russell Street, Mount to Brooks

This improvement involves a pavement widening to accommodate four travel lanes on approximately one-third mile of Russell Street between Mount Avenue and Brooks Street. Although the City is tentatively planning for construction of this project by the year 1990, no construction date has been established.

Estimated Project Cost: $114,000

Funding Source: State Maintenance Fund
City Gas Tax Fund

Committed Improvement "C" - Mullan Road, RS 263-1(4)1

This project consists of the reconstruction of Mullan Road beginning at Flynn Lane extending west 5.3 miles to Deschamps Lane. The existing roadway section will be widened to accommodate two 12-foot driving lanes and two four-foot paved shoulders. This project is planned to be constructed in two portions. It is anticipated to construct the first half of the project (2.8 miles) from Flynn to Quail Drive although no bid letting date has been set at this time.

Estimated Project Cost: $4,531,150

Funding Source: Federal Aid Secondary Funds

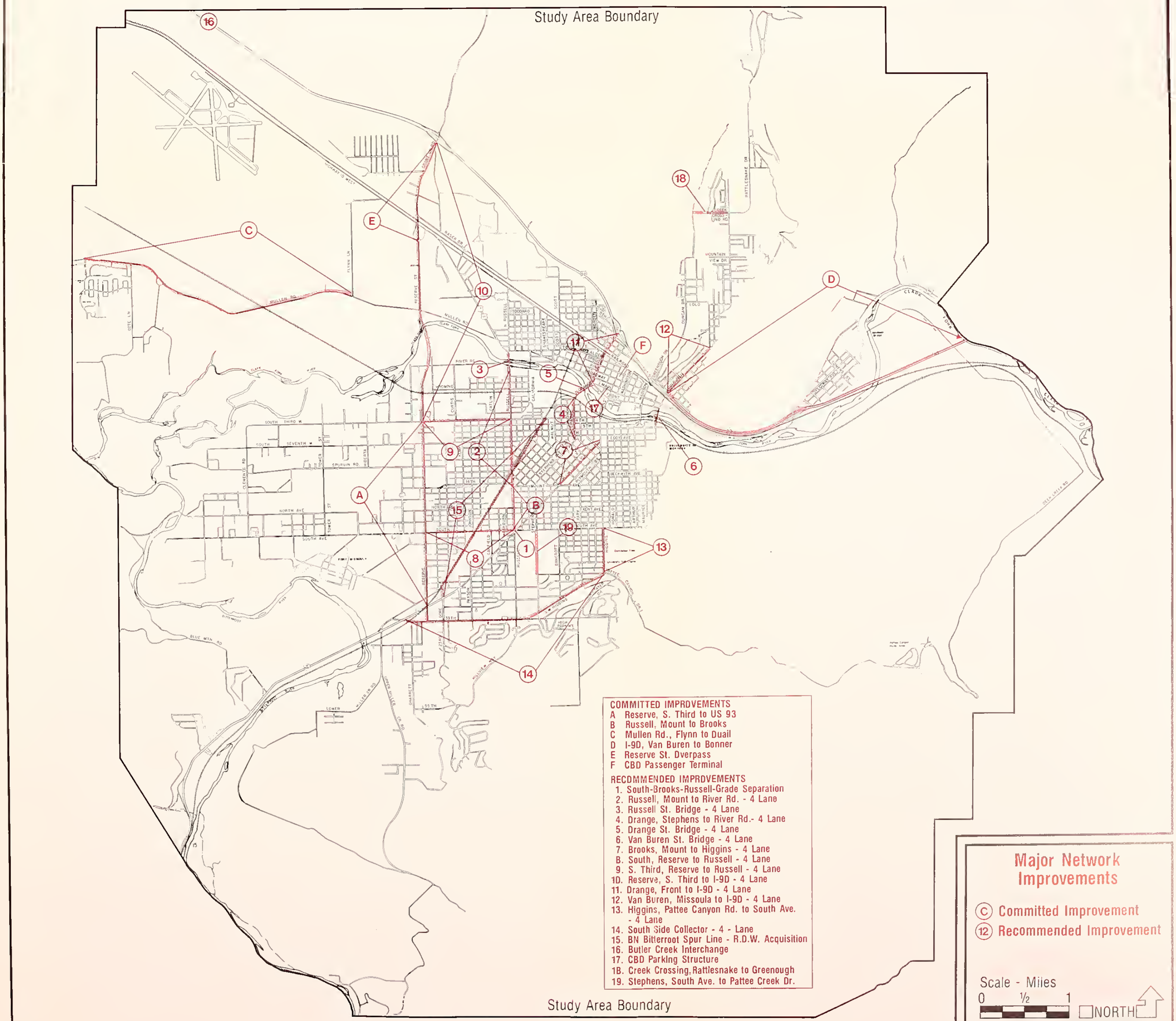
Committed Improvement "D" - I-90 to Bonner, IR90-2(75)106

This project involves the pavement rehabilitation of approximately 4.6 miles of Interstate between the Van Buren and Bonner Interchanges. This project was let to contract on March 26, 1987, and construction is scheduled to commence in the summer of 1987.

Estimated Project Cost: $1,705,400

Funding Source: Interstate 4-R Funds

Figure 11: Major Network Improvements



COMMITTED IMPROVEMENTS
- A Reserve, S. Third to US 93
- B Russell, Mount to Brooks
- C Mullen Rd., Flynn to Duail
- D I-9D, Van Buren to Bonner
- E Reserve St. Dverpass
- F CBD Passenger Terminal

RECOMMENDED IMPROVEMENTS
1. South-Brooks-Russell-Grade Separation
2. Russell, Mount to River Rd. - 4 Lane
3. Russell St. Bridge - 4 Lane
4. Drange, Stephens to River Rd.- 4 Lane
5. Drange St. Bridge - 4 Lane
6. Van Buren St. Bridge - 4 Lane
7. Brooks, Mount to Higgins - 4 Lane
8. South, Reserve to Russell - 4 Lane
9. S. Third, Reserve to Russell - 4 Lane
10. Reserve, S. Third to I-9D - 4 Lane
11. Drange, Front to I-9D - 4 Lane
12. Van Buren, Missoula to I-9D - 4 Lane
13. Higgins, Pattee Canyon Rd. to South Ave. - 4 Lane
14. South Side Collector - 4 - Lane
15. BN Bitterroot Spur Line - R.D.W. Acquisition
16. Butler Creek Interchange
17. CBD Parking Structure
18. Creek Crossing, Rattlesnake to Greenough
19. Stephens, South Ave. to Pattee Creek Dr.

Major Network Improvements

(C) Committed Improvement

(12) Recommended Improvement

Scale - Miles

0 ½ 1

NORTH

Robert Peccia & Associates, Helena, MT

Committed Improvement "E" - Reserve Street Overpass, RTF 71-1(6)1

This project generally consists of a pavement overlay, seal and cover on Reserve Street at I-90 and extending 1.6 miles to the south side of the Reserve Street Bridge over Broadway. This project was scheduled for letting to contract on May 28, 1987.

Estimated Project Cost: $118,000

Funding Source: Reconstruction Trust Fund

Committed Improvement "F" - CBD Passenger Terminal

This project, which involves the construction of a new off-street CBD passenger terminal to serve Missoula's transit bus system, is currently on hold.

Estimated Project Cost: $1,250,000

Funding Source: Urban Mass Transit Assistance Funds

Recommended Improvement No. 1 - Russell Street, Mount to River Road

The Russell Street corridor, one of Missoula's principal north-south arterials, currently carries 15,000 to 17,000 VPD. Presently this 1.25-mile-long section is a narrow two-lane roadway in very deteriorated condition. By the year 2010, this arterial will need to accommodate 22,000 to 24,000 VPD. It is recommended Russell be reconstructed to a four-lane facility complete with curb, gutter, sidewalk, and additional turning lanes at the signalized intersections. The Russell Street corridor generally has a right-of-way width of 60 feet and will require some additional right-of-way acquisition and a significant amount of utility relocation. This improvement will have an overall beneficial effect on the local air quality due to the increased dispersion area created by the widened road section.

Estimated Project Cost: $3,200,000*

Possible Funding Sources: Federal Aid Urban Funds
Local Funds

*Does not include right-of-way acquisition.

Recommended Improvement No. 2 - Russell Street Bridge

The Russell Street Bridge over the Clark Fork River was built in 1957. It is a concrete structure supporting a 24-foot-wide two-lane driving structure with narrow sidewalks on both sides. This structure presently carries approximately 16,000 VPD and typically is congested during the peak travel periods of

the day. The efficiency of the intersection at Russell and Broadway is adversely effected due to the close proximity of the bridge to the intersection. Current traffic demand calls for two southbound travel lanes away from the intersection. The existing two-lane bridge precludes this option. Traffic volumes over this structure are projected to increase to 20,000 vehicles per day by the year 2010. It is recommended to reconstruct this bridge to a four-lane section including bicycle lanes and sidewalks on both sides. Modifications to the bridge approaches would be included as part of this project.

Estimated Project Cost: $3,800,000

Possible Funding Sources: Federal Aid Urban Funds
County Bridge Fund
Bridge Rehabilitation and Replacement Fund

It is recommended that Russell Street Bridge be widened to accommodate four traffic lanes with bicycle lanes and sidewalks on both sides.

Recommended Improvement No. 3 - Orange Street, Stephens to River Street

Orange Street is a principal arterial which provides a direct route between the south side of the city (as well as Bitterroot Valley traffic on U.S. 93), and the CBD and the Interstate. This portion of Orange Street generally has a 40-foot-wide paved surface with two driving lanes for two-way travel and additional turn lanes at major intersections. The southern extension of this urban route on Stephens Avenue is a four-lane roadway which requires the traffic to merge to two lanes as it enters Orange Street. This portion of Orange Street presently handles approximately 14,000 VPD with considerable traffic congestion during peak travel periods. Traffic volumes are expected to increase to approximately 20,000 VPD over the next 20 years. The signalized

intersection at Third and Orange is currently operating at capacity and requires approach lane widening.

It is recommended this one-half mile portion of Orange Street be reconstructed to a four-lane facility with additional turning lanes provided at the major intersections. The existing 80 feet of right-of-way along Orange Street should accommodate the recommended roadway widening without the need for additional property acquisiton. This will provide continuous four-lane travel from the south side of the Clark Fork River south to U.S. 93. The widening of this corridor to four lanes will benefit air quality in the area by increasing travel speeds and reducing the amount of stopped delays.

Estimated Project Cost: $1,300,000

Possible Funding Source: Federal Aid Urban Funds
City Gas Tax Fund

Recommended Improvement No. 4 - Orange Street Bridge

The Orange Street Bridge over the Clark Fork River is a vital link in the network connecting the south side of the City with the CBD and the Interstate. This concrete structure was originally constructed in 1937 and supports a 30-foot-wide two-lane roadway section. In 1985 traffic volumes exceeded 16,000 VPD on this bridge with projections of 22,000 VPD by the year 2010. It is recommended this structure be reconstructed to accommodate four lanes for vehicle travel plus bicycle lanes and sidewalks. This improvement includes removal of the bridge portion over the old irrigation ditch and abandoned railroad line on the south side of the river. Bridge approaches would also be reconstructed as part of this improvement.

Estimated Project Cost: $5,000,000

Possible Funding Sources: Federal Aid Urban Funds
County Bridge Fund
Bridge Rehabilitation and Replacement Fund

Recommended Improvement No. 5 - South Avenue, Reserve to Russell

This mile long portion of South Avenue is presently in poor condition with most of the pavement section being 18 feet to 20 feet wide with dirt shoulders. Located at both ends of this corridor are Missoula's two most congested intersections. These problem intersections have previously been identified for reconstruction improvements in this chapter (Committed Improvement A" and Recommended Improvement No. 1). The South Avenue corridor recorded traffic volumes ranging from 10,000 to 13,000 VPD in 1985. The traffic assignment model projects over 17,000 VPD will travel this portion of South Avenue in the year 2010. It is recommended that South Avenue from Reserve to Russell be reconstructed to a four-lane pavement section complete with curb, gutter,

sidewalks, and bicycle lanes. Although the right-of-way is generally 60-feet wide along this section of South Avenue, some additional property acquisition will most likely be required. Providing an upgraded four-lane pavement section along South Avenue will improve the area's air quality by reducing the amount of reintrained dust presently caused by the unpaved shoulder areas.

Estimated Project Cost: $2,500,000*

Possible Funding Sources: Federal Aid Urban Funds
County Road Fund
City General Fund

*Does not include additional right-of-way.

The widening of South Avenue will require utility relocation as well as right-of-way acquisition.

Recommended Improvement No. 6 - Brooks, Mount to Higgins

The Brooks Street corridor, which connects U.S. 93 on the southwest end of the city to Higgins Avenue and the CBD, is Missoula's heaviest traveled principal arterial. This route through town is four lanes wide except for the section between Mount and Higgins. This portion of Brooks currently carries over 10,000 VPD with volumes expected to more than double over the next 20 years. Brooks Street between Mount and Higgins is a 40-foot-wide pavement section consisting of two travel lanes with parking on both sides. It is recommended that this 0.7 mile long section of Brooks be reconstructed to accommodate a four-lane facility including parking and bicycle lanes. The highway right-of-way along this portion of Brooks is 100-foot-wide; therefore, no right-of-way acquisition is anticipated.

Estimated Project Cost: $1,800,000

Possible Funding Source: Federal Aid Primary Funds

It is proposed to widen Brooks Street between Mount and Higgins to a four-lane roadway.

Recommended Improvement No. 7 - South Third Street, Reserve to Russell

This improvement consists of reconstructing South Third Street to a four-lane roadway from Reserve to Russell Street. This mile-long corridor currently accommodates approximately 9,500 VPD. The present roadway lies within a 60-foot right-of-way with a paved surface that is 24-feet wide carrying two travel lanes with dirt shoulders. By the year 2010 over 17,000 VPD will travel this route. The recommended pavement section should provide for four travel lanes with bicycle lanes and parking as well as curb, gutter, and sidewalks. This project will result in an overall benefit to local air quality.

Estimated Project Cost: $2,500,000*

Possible Funding Sources: Federal Aid Urban Funds
City Gas Tax Fund

*Does not include additional right-of-way.

Recommended Improvement No. 8 - Grade Separation of Brooks Street at the South - Brooks - Russell Intersection

The intersection of South, Brooks, and Russell creates the greatest bottleneck in the entire major street network. This intersection, which connects three large volume corridors, currently operates at capacity during peak travel periods. In 1985 the intersection accommodated approximately 44,000 approach vehicles per day (VPD) with volume projections indicating the demand will increase to 66,000 approach VPD by the year 2010.

Carbon monoxide monitoring conducted at this intersection indicates occasional violation of the federal eight-hour carbon monoxide standard. Continued violations may mandate the development of additional attainment strategies.

The existing intersection geometrics physically cannot handle the anticipated increase in volume over the next 20 years. A variety of turning movements are presently restricted in an effort to pass the current volumes. The operation of the at-grade intersection can only be improved by further restricting non-through traffic movements, redirecting the traffic onto other corridors, or eliminating one or more approaches.

A realistic view of the traffic flow characteristics in this area indicates that eliminating an approach would be difficult, if not impossible. Rerouting a portion of this traffic is the logical solution but at this time there are no acceptable parallel corridors that could draw the traffic away from this intersection. The future use of the present Burlington Northern Spur Line through town is the only realistic possibility for a parallel corridor; unfortunately, this strip of property is not available at this time. The acquisition of the Spur Line is discussed in Recommended Improvement No. 15.

It is recommended that an overpass structure be constructed to allow the Brooks Street traffic to travel over the remaining at-grade intersection of South and Russell. In this way the awkward six-way approach configuration is replaced with a standard four-way approach intersection. The Brooks Street traffic would then travel smoothly over the surface intersection without conflict. Traffic desiring to access Brooks from South Avenue would be redirected onto Catlin Street west of the overpass and would similarly use Stephens Avenue on the East Side. Access onto Brooks from Russell Street would be accommodated by Kent Avenue to the north and Fairview Avenue on the south side of the intersection. These four connector routes would likewise serve the traffic desiring to exit Brooks onto South or Russell Avenues.

This recommended improvement was modeled with the computer and proved to be an effective solution to the problem. The four-lane overpass structure on Brooks, which would be approximately 25 feet high and extend 750 feet on each side of the intersection, would carry approximately 28,000 VPD in the year 2010. The surface intersection of South and Russell can easily handle the projected approach traffic while providing for all desired turning movements. The four connector streets would carry moderate traffic volumes, Fairview Avenue being the heaviest with 8,000 vehicles per day. Figure No. 12 graphically depicts the geometrics and year 2010 traffic volume projections for this improvement.

Estimated Project Cost: $6,300,000

Possible Funding Sources: Federal Aid Primary Fund
Federal Aid Urban Fund
Local Funds

Figure 12: Major Network Improvement No. 8 - Grade Separation of Brooks at South - Brooks - Russell

Volumes Represent Year 2010 Annual Average Daily Traffic

Recommended Improvement No. 9 - River Crossing in the Vicinity of Van Buren Street

A review of the traffic circulation patterns at the east end of the CBD reveals that traffic tends to cross the Clark Fork on the Madison Street Bridge then proceed east on Broadway to the Van Buren Interstate interchange. Heavy traffic volumes in the range of 34,000 VPD are projected for this "dog leg" corridor by the year 2010. Figure 13 shows the projected traffic volumes anticipated in the year 2010 if no improvements are made. This volume of traffic will cripple the effectiveness of the Madison Street River crossing and

several blocks of Broadway. Future traffic demands will require that the Madison Street Bridge be widened to six lanes or construction of a second bridge in the area. Widening the bridge will enhance the river crossing but will not address the congestion problems created at the intersections on Broadway. The recommended solution is to reroute a portion of the traffic across the river in the vicinity of Van Buren Street. At one time a vehicle bridge existed at this location but was converted to pedestrian and bicycle use only when the structure could no longer handle the vehicle traffic loadings. A vehicle bridge in this area would provide a direct connection between the Van Buren interchange and the 5th-6th Street Couplet while providing excellent access to the University. The computer model indicated a link addition across the Clark Fork at this location would completely relieve the overloading of Broadway intersections and the Madison Street Bridge by shifting approximately 18,000 VPD to the new crossing. This improvement eliminates the necessity of reconstructing the Madison Bridge to six lanes.

It is noted that during the public hearing process several comments were received from the University expressing their position on the Van Buren Street crossing. The University felt the new crossing would adversely impact the north end of the campus. Several previous studies have addressed the University's plans and should be reviewed when considering the river crossing alternatives. The University concerns and future plans are included in the following reports:

RUDAT: Regional Urban Design Assistance Team, 1980, by Thomas R. Aidala, et. al.

MEFIC: Major Events Facility Feasibility Study, 1983, by John B. Dykstra & Associates.

Urban Renewal Plan, 1978, by Missoula Planning Board.

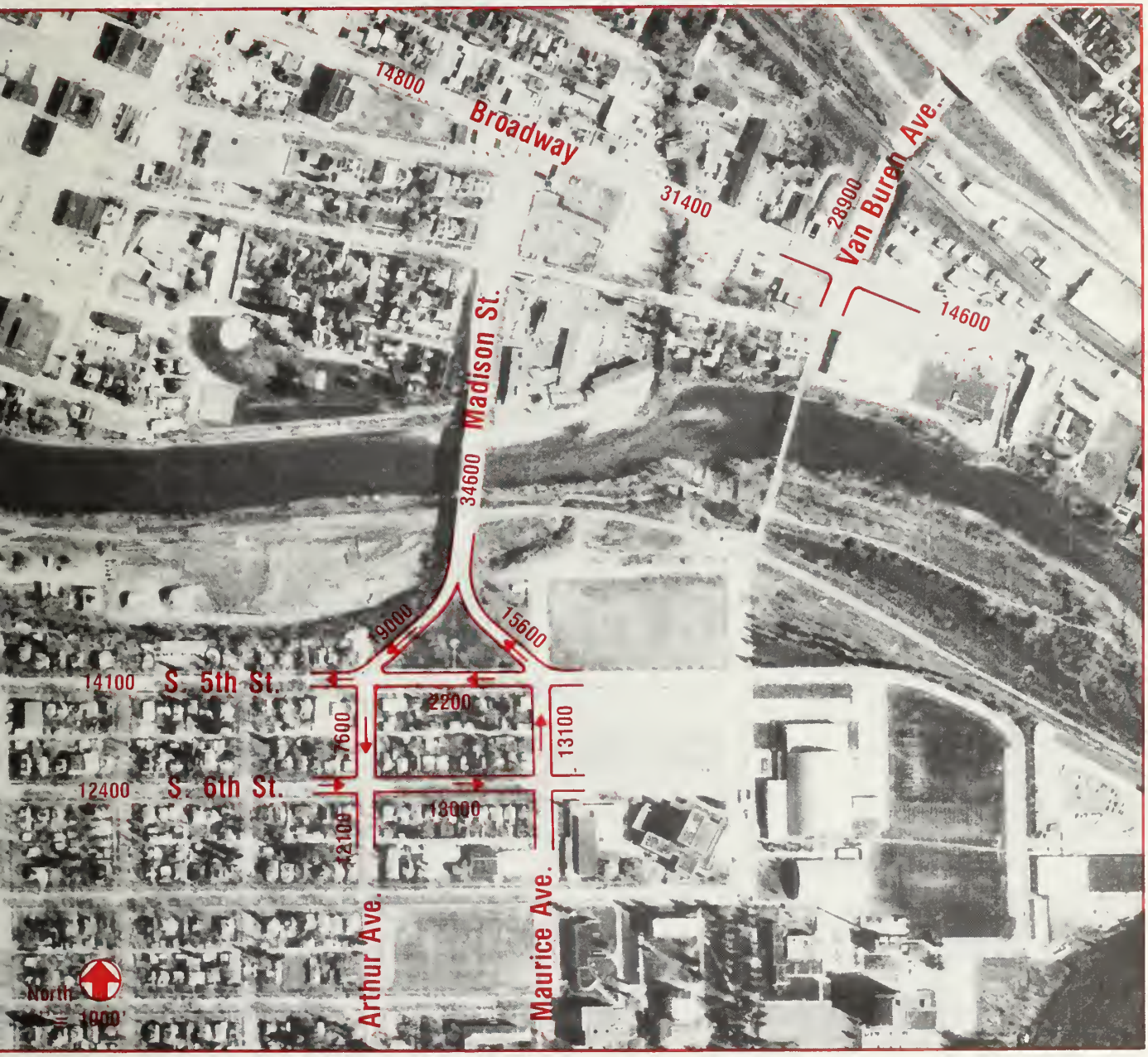
Long-Range Planning Report, 1986, by University of Missoula.

Estimated Project Cost: $3,700,000

Possible Funding Source: County Bridge Fund

Figure 13: River Crossing in the Vicinity of Van Buren Street Major Network Improvement No. 9

Traffic Volumes Represent Year 2010 Without Any Improvements



Recommended Improvement No. 10 - Orange Street, Front Street to I-90

This eight-block-long section of Orange Street currently accommodates traffic volumes that exceed 11,000 VPD north of Broadway and 16,000 VPD at the Orange Street Bridge. By the year 2010 this section of road will carry over 20,000 VPD. It is recommended that Orange Street north of the river be expanded to include four travel lanes with left turn lanes provided at the major intersections.

The Orange Street underpass will become a major bottleneck in the future unless it is widened to accommodate four traffic lanes.

A major obstacle in converting Orange Street to four lanes is the railroad underpass north of Alder Street. This underpass not only goes under several sets of tracks but also the Burlington Northern Freight House Building, which is currently leasing the building (20-year lease) to a local sporting goods manufacturer. Reconstruction of the underpass is complicated due to cost of the surface structures owned by Burlington Northern. Unfortunately, this underpass will eventually represent the only two-lane bottleneck along an otherwise all four-lane corridor. Regardless of the railroad's future plans, a four-lane underpass will be required to handle the projected traffic. The reconstructed underpass should be wide enough to provide four driving lanes, two bicycle lanes, and sidewalks. Eighty feet of right-of-way is available on Orange south of the underpass while a width of 66 feet is owned on the north side. The widening of North Orange Street to four lanes will provide continuous four-lane travel from the I-90 Interchange south to Stephens Avenue and on to Brooks.

Estimated Project Cost: $5,100,000

Possible Funding Sources: Federal Aid Urban Funds
City Gas Tax Fund

Recommended Improvement No. 11 - Reserve Street, South Third to I-90 Interchange

Reconstruction to a four-lane facility of Reserve Street from U.S. 93 (Brooks) to the South Third West intersection is scheduled for 1991. Reserve

Street north of South Third West will remain a two-lane roadway until traffic volumes justify additional travel lanes. Currently, traffic volumes along this portion of the Reserve Street corridor range from 13,000 VPD at the Clark Fork Bridge to 8,000 VPD between Broadway and I-90. By the year 2010 these figures will increase to 24,000 VPD at the bridge and 13,000 VPD north of Broadway. This present roadway section should provide adequate service through the year 2000 assuming friction from the roadside access does not increase. At that time it will be desirable to expand Reserve Street to a four-lane facility from the Interstate south to U.S. 93. The recommended pavement section includes four driving lanes with paved shoulders wide enough to accommodate a bicycle lane and emergency parking. This corridor should also be provided with street lighting as part of this project.

There are four bridge structures along this section of Reserve Street. The structure over the old C.M. ST.P.& P. Railroad will be eliminated at the time of reconstruction due to the railroad closure. The two bridges over the Clark Fork River will require widening at the time of reconstruction to handle four driving lanes as will the grade separation at Broadway.

Estimated Highway Cost: $ 8,700,000
Estimated Bridge Costs: $ 3,200,000
Total Estimated Cost: $11,900,000*

Possible Funding Sources: Federal Bridge Rehabilitation Funds
Federal Aid Primary Funds
Federal Aid Urban Funds
County Road Fund
City Gas Tax Fund

*Does not include any additional right-of-way.

Recommended Improvement No. 12 - Van Buren Street, I-90 to Missoula Avenue

This section of Van Buren Street has a pavement width of 30 feet which lies within the 66-foot right-of-way and is the major route serving the Rattlesnake drainage. Traffic volumes on Van Buren just north of the Interstate Interchange are expected to increase from 8,000 VPD in 1985 to 17,000 VPD by the year 2010. Volumes of that magnitude will require four travel lanes to provide an acceptable level of service. It is recommended this 0.7 mile portion of Van Buren be reconstructed to a four-lane facility complete with bicycle lanes, curb, gutter, and sidewalks. No additional right-of-way should be required.

Estimated Project Cost: $1,800,000

Possible Funding Sources: Federal Aid Urban Funds
City Gas Tax Fund

Recommended Improvement No. 13 - Higgins Avenue, Pattee Canyon Road to South Avenue

This portion of Higgins Avenue is 32 feet wide and carries over 9,000 vehicles per day. This road serves as a major connector between the South Hills residential area and the University/Downtown area. Traffic volumes are anticipated to exceed 15,000 VPD by the year 2010. This one-half mile long corridor should be widened to accommodate future traffic demand. The recommended roadway section includes four driving lanes with a bicycle lane on each side and a sidewalk on the west side of the road. Since this portion of Higgins has 80 feet of right-of-way, no land acquisition will be required.

Estimated Project Cost: $1,300,000

Possible Funding Sources: Federal Aid Urban Funds
City Gas Tax Fund

Recommended Improvement No. 14 - BN Bitterroot Spur Line

The Railroad Spur Line that crosses the city from the Brooks/ Reserve Intersection northeast to the Clark Fork River could be a significant factor in dealing with the post-year 2000 traffic volumes. This railroad line, which occupies approximately 100 feet of right-of-way, would be an ideal location for a new crosstown arterial. The facility could be a two- or four-lane and would have limited access resulting in excellent travel characteristics. The new arterial could intersect Brooks Street at Dore Lane and extend northeast through town and connect to the Fifth/Sixth couplet east of Russell Street (see Figure 14). An arterial of this nature would provide an alternative to the Brooks Street corridor. In the traffic assignment computer model test run the Spur Line arterial rerouted over 20,000 vehicles, reducing Brooks Street volumes (year 2010) from 40,000 to 26,000 VPD.

It is recommended this parcel of land now occupied by the railroad be acquired when it becomes available and reserved for the use of a crosstown arterial highway.

Estimated Right-of-Way Cost: Unknown

Possible Funding Source: Local Funds

Recommended Improvement No. 15 - Southside Collector

The 39th Street, Southwest Higgins corridor is the major collector serving Pattee Canyon and the entire South Hills residential area. Traffic volumes on this east-west corridor will increase to over 15,000 VPD by the year 2010. Thirty-ninth Street is 24 feet wide while Southwest Higgins is slightly wider at 32 feet. This roadway cross-section will not adequately handle the anticipated

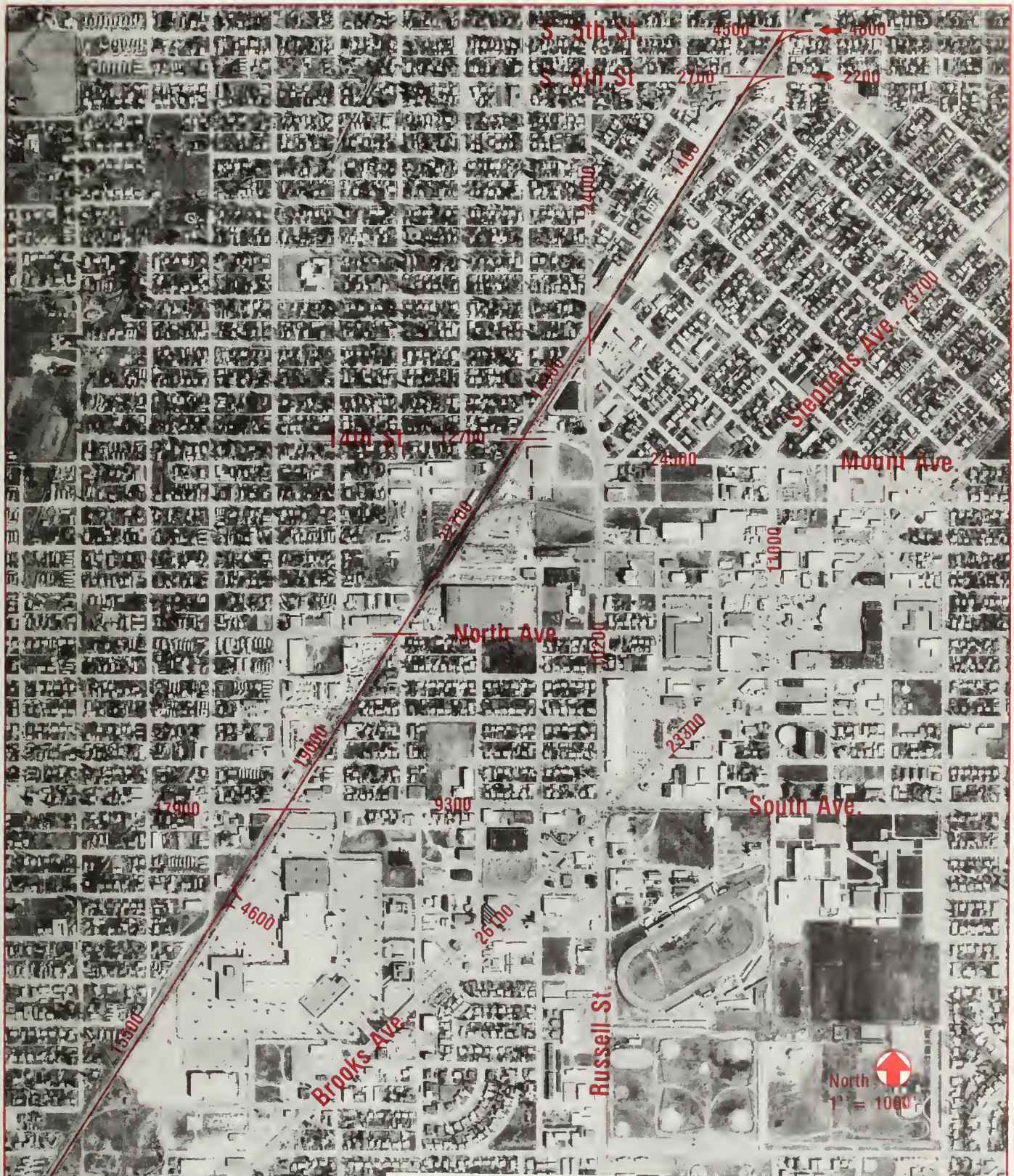


Figure 14
Major Network Improvement No. 14
B.N. Bitterroot Spur Line

Volumes Represent Year 2010 Average Annual Daily Traffic
With The Limited Access Arterial Along The Spur Line

traffic volumes. It is recommended to widen this 2.3 mile corridor to a four-lane section with bicycle lanes on both sides. Present right-of-way is 70-feet wide on 39th Street and 100-feet wide on Southwest Higgins. No right-of-way acquisition should be necessary. The widening of this corridor will reduce air quality problems currently generated by the narrow road section and unpaved shoulder areas.

Estimated Project Cost: $5,800,000

Possible Funding Sources: Federal Aid Urban Funds
County Road Fund
City Gas Tax Fund

Recommended Improvement No. 16 - Stephens, South Avenue to Pattee Creek Drive

The addition of a two-way roadway along Stephens is proposed between South Avenue and Pattee Creek Drive. This project would complete the Orange Street/Stephens Avenue corridor from I-90 south through town to Southwest Higgins. This link addition to the system will fill out the local street network in the southeast portion of the city. The City is hopeful that the necessary right-of-way would be dedicated by the County Fairgrounds property and the adjoining School District property.

Estimated Project Cost: $500,000

Possible Funding Source: City Gas Tax Fund

Recommended Improvement No. 17 - Creek Crossing, Rattlesnake to Greenough

This project would involve construction a two-lane roadway including a small bridge structure between Rattlesnake and Greenough Roads at Creek Crossing Road. The addition of this link to the network is desirable because it will allow for traffic to redistribute according to travel desires between the Rattlesnake and Greenough Road corridors. The shift in traffic away from the lower Rattlesnake and Van Buren is considered beneficial. Additional right-of-way will be required for this project.

Estimated Project Cost: $400,000*

Possible Funding Source: County Road Fund

*Does not include right-of-way acquisition.

Recommended Improvement No. 18 - Butler Creek Interchange

An Interstate interchange has been proposed west of Missoula in the vicinity of the airport at Butler Creek. Although this interchange does not address any particular transportation problem, it is considered a desirable

addition to the major street network. Providing access to the Interstate at this location would be beneficial to the airport and commuter traffic that currently uses old Highway 10. The interchange would also stimulate commercial growth in the immediate area. It is recommended that planning for this interchange improvement be continued and possible private financial sources identified.

Estimated Project Cost: $2,200,000

Possible Funding Sources: Interstate 4-R Funds
Private Funds

Recommended Improvement No. 19 - CBD Parking Structure

A 400-stall, multi-level parking structure has been proposed to replace the existing surface parking lot on Main Street between Ryman and Higgins. The parking structure will provide for the future growth of both short- and long-term parking demands in the CBD. Construction of this type of structure is recommended. The additional space will satisfy the current long-term shortage and provide space for the growth of the CBD in the future.

Estimated Project Cost: $3,000,000

Possible Funding Source: Missoula Parking Commission

Chapter VII: Financial Plan

A. Traditional Funding Sources and Categories

The previous sections of this plan identified problems with the transportation system and recommended appropriate corrective measures. This financial section discusses what is perhaps the greatest transportation problem facing the Missoula community, which is "how can we pay for the needed improvements".

Sources of funds for highway transportation system improvements include federal, state, local, and private funds. A transportation plan is concerned with the major streets in a community, many of which fall on federal aid systems and have traditionally been financed with funding allocations from the federal and state governments. However, recent cutbacks in federal aid have changed this picture; and the future trend is that an increasing amount of the financial burden for transportation system improvements will fall on local governments and private financial sources.

The funding categories which follow encompass the major sources available to the urban areas within the State of Montana at this time. It should be recognized that there are many changes occurring in funding programs, and the programs described may very shortly be obsolete or reorganized.

1. Federal

The "Federal Aid Highway Program" refers to all activities funded through the Federal Highway Administration (FHWA) and administered by the Montana Department of Highways (MDOH). This program is modified periodically through a Congressional procedure that amends Title 23 of the United States Code which embodies most of the laws that govern the Federal Aid Highway Program. These amendments to the Code are commonly called Highway Acts, the most recent of which is the Surface Transportation and Uniform Relocation Assistance Act of 1987 (passed by Congress on April 2, 1987). This Highway Act defines the amount of financial aid available to each state for more than 20 different funding categories, each with a defined use.

The resources for this aid come from the "Highway Trust Fund", which is a user-supported fund whereby federal tax revenues finance highway improvements and other highway-related programs. The current user fee structure consists of a federal tax on gasoline (9¢/gal.), diesel fuel (9¢/gal.), gasohol (4¢/gal), and tires (rate varies according to weight of tire). In addition to these taxes, revenue is generated through a 12% retail sales tax on trucks over 33,000 pounds gross vehicle weight (GVW) and trailers over 26,000

pounds GVW, and a heavy vehicle (over 33,000 pounds) use fee which varies according to GVW.[5]

Although the Surface Transportation Assistance Act provides federal aid for a wide variety of categories, only those federal programs which Missoula may be eligible for are discussed below.

a. Interstate 4-R

Federal funds are now available for rehabilitation, reconstruction, resurfacing, and restoration of the interstate system. The age and deteriorating condition of the interstate system has motivated the initiation of this relatively new program which is expected to replace much of the previous emphasis on construction of an interstate system with emphasis on keeping the interstate system in good repair. Priorities for interstate rehabilitation projects are established by the Department of Highways with concurrence by the Highway Commission and are approved by the Federal Highway Administration.

b. Primary System

Federal funds are available under this program for projects on any approved primary route. Each fiscal year, federal funds are matched with state funds at the established matching ratio. These funds are then distributed to the five financial districts in the state, based on the ratio of the deficient primary mileage in each financial district to the total deficient mileage in the state. Priorities within each financial district on the primary system are established by the Department of Highways with the concurrence of the Highway Commission.

c. Secondary System

Federal funds are available under this program for projects on any approved secondary route. Federal rural secondary funds are matched with state funds at the established matching rate, and then distributed to the 56 counties by an apportionment formula including factors such as land area, population, road mileage, and value of rural land. Project priorities are established by the County Commissioners with concurrence by the Department of Highways.

d. Urban System

Federal funds are available under this program for projects on approved Federal Aid Urban routes in the 15 urban areas within Montana with populations over 5,000. Federal urban system funds are matched with state funds at the established matching ratio and then distributed to these urban areas based on urban area population figures. Project priorities under this program are established by local transportation policy committees or the responsible elected local officials.

e. Hazard Elimination and Safety Program

This program provides for funding of safety-related projects on Montana's public roads. The federal allocation of funds is matched with state funds according to the established matching ratio. Project priorities are established by the Montana Department of Highways on a statewide basis using project benefit/cost ratios. Since Missoula area projects must compete for funds on a state-wide basis, this program should not be considered as a reliable funding source.

f. Rail-Highway Crossing Program

A federal allocation and matching state funds are used in this program to correct problem at-grade highway-railroad crossings. The funds are distributed statewide with project priorities being established by the Montana Department of Highways using a hazard index rating system. Projects generally include crossing signal installation and approach modifications. Safety improvements involving an at-grade railroad crossing could possibly be funded through this program.

g. Highway Bridge Rehabilitation and Replacement Program

This program, which is financed with federal and state matching funds, is aimed at correcting the deficient highway bridges within the state. Project priorities are established by the Montana Department of Highways on a statewide basis using a deficiency rating system. Although the Orange, Higgins, and Russell Street bridges over the Clark Fork and the Reserve Street Bridge over old Highway 10 meet the minimum eligibility requirements (deficiency rating of 80 or less), none of these bridge projects meet the funding cutoff rating of 40 or less. It is unlikely any bridge project in Missoula will be funded through this program in the near future although some of these bridges may become eligible for funding through this program over the course of the next 20 years.

h. Urban Mass Transit Assistance Program

Federal operating assistance funds through the Urban Mass Transit Assistance (UMTA) Program are annually allocated to Missoula. UMTA funds can only be used for transit-related purposes. The security of this federal program at present funding levels is questionable due to federal cutbacks although it is anticipated UMTA will continue to be a viable funding source. Funds are distributed through the following categories provided the appropriate grant applications are submitted.

UMTA Section 9	Funding allocations are available to urban areas with populations greater than 50,000 (Missoula, Great Falls, Billings). Distributions are based on several factors including population and bus mileage. Section 9 funds are available in two

	subcategories: 1) operatoral funds ($163,604 FY 87 allocation to Missoula) and 2) capital improvements and planning funds (amount available to Missoula in FY 87 is $657,387).[6]
UMTA Section 8	Funds are available to urban areas with populations greater than 50,000. The Office of Community Development currently receives an annual allocation of $20,000 (FY 87) to be used only for the planning of the passenger transit system.[7]
UMTA Section 3	This category consists of discretionary funds for capital improvements to urban transit systems. No Section 3 monies have been distributed in Region 8 for several years and are, therefore, of questionable reliability as a funding source.[8]
UMTA Section 16-B2	This category of funding provides capital assistance for the elderly and handicapped. Only private, non-profit organizations are eligible to compete for a portion of the State's $200,000 annual allocation.[9]

Funding estimates by financial category were done from information provided by the Department of Highways Program Development Division. These estimates were based on the funds available by category as of November 1, 1986, and project allocations for fiscal years 1987 and 1988. The assumption was made that the projected 1988 funding amounts by category would remain constant throughout the 20-year planning period.

It is recognized that highway funding is being revised and is in a state of flux at this time. Insufficient information is available to provide any better estimates than the method described.

Table No. 10 shows the estimated funding levels for those federal aid highway programs that can be used for highway construction and reconstruction and that annually allocate funds for use in the Missoula area. It should be noted that Financial District No. 1 for primary funds includes nine western Montana counties and only a portion of these funds will be used in the Missoula area. Likewise, the secondary fund allocation is utilized throughout Missoula County, and only a portion of these funds are available for use in the Missoula study area. The other federal programs are not included in this table due to the nature of the programs and the uncertainty of individual project eligibility.

TABLE NO. 10

AVAILABLE FUNDS THROUGH FEDERAL AID HIGHWAY PROGRAMS[10]
(Figures Reflect Federal Plus State Matching Funds)

	Primary* (FD No.1)	Rural Secondary (Missoula Co.)	Urban System (Missoula)
Unobligated Balance (11/1/86) Includes 1986 Allocation	$6,827,000	($ 798,000)	$ 2,765,000
Projected Annual Allocations:			
1987	11,600,000	383,000	742,000
1988	16,200,000	383,000	742,000
1989 - 2010	16,200,000	383,000	742,000
Total, 1986 - 2010	$391,027,000	$8,394,000	$20,573,000
Total Available to Missoula Study Area	?	?	$20,573,000

*Funding District No. 1 includes Missoula, Flathead, Granite, Lake, Lincoln, Mineral, Powell, Ravalli, and Sanders Counties. The portion of funds to be available for use by the Missoula urban area is difficult to estimate.

2. State

In 1987 the State Legislature reestablished the Reconstruction Trust Fund (RTF). The revenues for this fund are generated in part from user fees in the form of a state fuel tax (20¢/gal. for gasoline and diesel). The fund also receives 12% of the state's coal severance tax. The RTF was designed to address the shortfalls of the federal aid program by providing the additional financing necessary for the reconstruction of the rural primary road system.[11]

Since the thrust of the Reconstruction Trust Fund is to repair the rural primary road system, the transportation needs of the Missoula urban area, with the exception of Committed Improvement E "Reserve Street Overpass", would most likely not be funded through the RTF.[12]

In addition to funding the RTF program, the State fuel tax (20¢/ gal.) is responsible for generating the road maintenance funds used by several

agencies. The Missoula area portion of the State fuel tax revenues are apportioned by a formula established by the Legislature to the City (City Gas Tax Fund), the County (County Road Fund). The State Highway Maintenance Department also receives a portion of the Gas Tax revenues (State Maintenance Fund) for the maintenance of state highways (both direct maintenance and contracted maintenance with the City). These apportionments can only be used for materials and labor involved in roadway reconstruction and maintenance.

3. Local

Local governments generate revenue through a variety of funding mechanisms. Typically, several programs are established to budget and disperse the local revenues. Each program is tailored to accomplish a specific function or provide particular services.

The following is a summary of the city and county transportation programs contained in their fiscal year 1987 budgets.

a. City of Missoula

1) General Fund

This fund provides monies for most of the major city functions such as government administration, public works, police, fire and parks. Typically, revenues are generated through various local fees and permits, federal grants, intergovernmental fund transfers, and a general fund mill levy. Approximately $9.3 million is budgeted for the general fund in FY 87.[13]

Several transportation-oriented services are supported by this fund including public works (engineering and streets) and the Police Department. Historically, these departments provide only operational and maintenance type services such as traffic law enforcement, the bike program, pavement repair (chip seals and overlays), striping and signing, traffic signal maintenance, street lighting, street cleaning, and winter maintenance (sanding and plowing).

Although most of the highway-designated monies are maintenance oriented, some new construction and street-widening projects are financed through the general fund. It has also been used in conjunction with other resources, such as the Gas Tax Fund or Materials Special Improvement District (SID) Fund, to jointly finance highway projects.

2) Special Revenue Funds

These funds are used to budget and distribute revenues legally restricted to a specific purpose. Several benefit the transportation system and are discussed briefly below.

Missoula Redevelopment Agency (MRA). This agency provides a variety of services for a specific area in the Central Business District. Services range from land acquisition to planning and management services all in the interest of preserving the existing public investment and promoting private business in the downtown area. The MRA is financed through tax increment financing in the CBD area. In the past the MRA has provided street and parking improvements as well as street beautification through planting trees and providing bike racks, trash receptacles and street benches. The MRA is a possible funding source for any eligible improvements recommended within the CBD.

SID Revolving Fund. This fund provides financial support to special improvement districts whenever insufficient monies are available to meet bond payments. Street SID's can be established by the City with repayment of the bonds made only by those adjoining landowners who directly benefit from the street improvement. In the past the City, through the General Fund, has often furnished the labor and equipment necessary for a project with the SID providing the cost of the materials. The revolving fund supports the SID process by supplying the required financial back-up to prevent the City from incurring unnecessary debt due to delinquent SID payments.

Gas Tax Fund. The State gasoline tax revenues are managed through this fund. These monies can only be spent on labor and materials for street maintenance or construction. Historically, this fund receives approximately $550,000 annually with the majority directed at badly needed local street reconstruction and maintenance.[14] Some of the recommended TSM improvements could possibly be financed through this source.

Community Development Block Grant (CDBG) Program. Federal CDBG funds are administered through this mechanism. The budget for FY 87 reflects revenues in the amount of approximately $317,000.[15] A portion will be used to help finance improvements to California, Ashland, and Cedar Streets which are adjacent to the Shady Grove CDBG site. These funds can only be spent in conjunction with a CDBG project and should not be considered a reliable source of funds for transportation system improvements.

3) Capital Improvements Fund

Major capital improvements to the city's infrastructure are financed through this fund. The Capital Improvements Program is a five-year planning program dedicated to guiding the city's capital expenditures. Historically these monies have been used for major equipment purchases and repair of municipal non-highway facilities (i.e., city buildings, parks, tennis courts). Revenues are generated through user fees and other fund transfers (typically from the general fund).

Although major street construction projects are technically eligible for financing through this fund, it is unlikely the City would use it for that purpose.[16]

4) Enterprise Funds

This fund was established to administer revenues generated solely from user charges for particular improvement projects. Typically this resource has been used to finance sewer utilities and wastewater treatment facility improvement projects. Major highway construction projects could also be funded through this mechanism provided an equitable system of user charges could be established such as with a transportation utility.

b. Missoula County

1) Road Fund

The County Road Fund provides for construction, maintenance, and repair of all county roads that do not lie within the corporate limits of any city or town. This fund is financed through various intergovernmental fund transfers (i.e., state gas tax allocation and motor vehicle tax revenues) and a county (only) mill levy, which has a ceiling limit of 15 mills. The levy is 13.83 mills in FY 87 resulting in a budget of approximately $2.4 million.[17]

Road fund monies are primarily used for maintenance with very little allocated for new construction.[18] This is a viable source of financing for those recommended TSM improvements within the county road system. It should be noted that, of all the miles of county road, only a small portion lies within the study area boundaries. Projects receiving financing through this fund must compete on a countywide basis for the available revenues.

2) Bridge Fund

The Bridge Fund provides financing for engineering services, capital finances, and all necessary maintenance required for the upkeep of all county bridges (111) and roadway culverts (900), including those located within corporate limits. In addition to maintenance operations, it provides for new bridge lighting and sidewalk projects as well as bridge widening and reconstruction. The FY 87 budget has allocated approximately $686,000 for the Bridge Fund.[19] These monies are generated through intergovernmental fund transfers (i.e., state motor vehicle revenues) and a countywide mill levy. In FY 87 the County is assessing the taxable limit of four mills for this fund. Most of the projects financed are for bridge maintenance operations with minimal new bridge construction.[20]

3) Rural Special Improvement District (RSID) Revolving Fund

This fund is used to administer and distribute funds for specific RSID projects. A mill levy is assessed only when delinquent bond payments require it. Any transportation-oriented projects that could be set up as a RSID would be handled through this fund.

4) Special Bond Funds

Special bond funds have been established by the County in the past in order to accomplish a particularly expensive project (i.e., Higgins Bridge Bond Fund). Approval by the votes is required to authorize this type of fund. Major transportation improvements benefiting a broad cross-section of the county population could be financed by a bond sale and administered through this fund.

5) Capital Improvements Fund

The required finances for any major capital improvements can be accumulated in this fund. Revenues are provided through loans from other county funds. Monies transferred for this purpose must be repaid within ten years. Although a major transportation project is a capital improvement and could be funded in this manner, Missoula County traditionally does not finance highway projects through the Capital Improvements Fund.

6) Specialized Transportation Fund

In FY 87 an .18 mill levy is used to generate the revenues for this fund, which supplements the cost of handicapped bus service to county residents.[21] Presently, the Mountain Lion is under contract for these services.

B. Local Funding Alternatives

The previous section reviewed the traditional sources of revenues used for transportation improvements. Due to reductions in these programs, it has become necessary to rely on other local funding alternatives. The mechanisms discussed below are considered the most viable sources for transportation improvements funding. Some of these financing options have been or are presently being used in the Missoula area (i.e., general obligation bonds and tax increment financing). These mechanisms should be re-examined to determine if they can be utilized to fund needed improvements to the transportation system.

1. Local Option Gas Tax

A local option gas tax of up to two cents per gallon can be established on a countywide basis if approved by the voters in that county. This funding source, if established in Missoula County, would generate approximately

$600,000 annually.[22] A fund of this nature could provide for the implementation of many of the recommended transportation improvements and is considered an excellent potential source of local funds. The advantage of this mechanism is that it only taxes those who use the transportation system and the public is taxed according to usage.

2. Transportation Utility

A transportation utility could be created whereby user fees would be established and the general public assessed annually. Specific projects would be identified for funding through the utility similar to the City of Missoula's current practice of sewer utilities. A transportation utility would provide a dependable continuous funding source with the ability to adjust the user fee structure to accommodate future project needs.

3. General Obligation (G.O.) Bond Sale

A General Obligation Bond sale could be used to finance a specific set of major highway improvements. The sale of G.O. bonds, if approved by the voting community, would provide the initial money required for major improvements to the badly deteriorated transportation system. The advantage of utilizing this funding method is that when the bond is retired the obligation of the taxpaying public is likewise retired. The ramifications of Initiative 105 passed in the 1986 general election (which froze property tax levies at 1986 levels) may restrict the use of G.O. bonds unless there is a reduction in the property tax levy equal to the bond-related increase.

4. Development Exactions

As mentioned in the Private Funding Section, development fees or exactions are an excellent mechanism to provide for municipal infrastructure improvements necessitated by private development. Establishment of an equitable fee structure would be required, assessing developers according to project impact (i.e., additional vehicle trips generated or, on a more fundamental basis, square footage of floor space). Once the mechanism is in place, all new development would be reviewed by the local agency and assessing accordingly.

5. Tax Increment Financing

Increment financing has been used in many municipalities to generate revenues for particular public improvement projects. Currently, the MRA is funded through tax increment financing in the Central Business District. This method establishes a tax increment district with defined boundaries. As improvements are made within the district and property values increase, the incremental increase in the property tax is earmarked for this fund and used to make additional improvements. Revenues generated have certain restrictions as to expenditures and must only be used for improvements within the district.

Although this method of financing is currently used, additional financing districts could be established to accomplish a variety of transportation improvements.

6. Multi-Jurisdictional Service District

The use of this type of funding tool was authorized in 1985 by the State Legislature. This procedure establishes a district boundary similar to an SID with the exception that the district may extend across city and county boundaries. In this way an urban transportation district could be established to fund a particular public highway improvement that extends across a municipal boundary (corporate limits, urban limits, county line). The structure of the fund is similar to the SID with bonds issued to defray the cost of improvements and bond payments raised through a districtwide assessment.[23]

7. Local Improvement District

This funding mechanism is restricted to counties only. A county may establish a local improvement district only for road improvements. Although the district is similar to a RSID, its major benefit is that the county may initiate a local improvement district through a more streamlined process than the RSID protest procedure.[24]

8. Other Funding Mechanisms

There are various local option taxes (not yet legal in Montana) that would generate the necessary funding for infrastructure improvements. A local sales tax or a luxury tax (similar to the resort tax in West Yellowstone) would be an excellent revenue generator. Other local option taxes such as a hotel bed tax or a wheel tax would greatly improve the budget outlook. Certain forms of these local tax options are in use in other states and are periodically considered by Montana's Legislature. Any one of these methods would enable the local authority to accelerate needed improvements. As these mechanisms are authorized for use in Montana, local governments will gain additional financial flexibility in meeting community needs.

C. Conclusions and Recommendations

Section A of this chapter reviewed the traditional federal, state, and local funding categories. In the past these sources have been relied on almost exclusively, with an emphasis on federal programs, to meet the needs of the growing community. Even with federal programs at current funding levels, the transportation needs of the Missoula urban area far outstrip available funds. The Congressional budget-balancing procedures make reliability of these funding sources questionable. It is anticipated that the funding levels of these programs will be reduced or, at best, stay at current levels in future years.

Section B of this chapter examined several local alternatives for generating necessary revenues. The city and county governments will need to create new forms of revenue and/or divert existing revenues from other resources to meet both present and future transportation system demands. Since Initiative 105 froze property taxes at 1986 levels, the local government will no longer be able to simply raise property taxes to cover expenses. New user fee structures must be established using various funding options depending on the type, location, and impact of the improvements desired.

The first priority is to maximize the use of federal and state programs by making matching funds available and applying for eligible grants. Community leaders should also be realistic as to the limits of these federal and state funding sources. Only two or three of the major improvements recommended in this plan update are financially feasible in the next 20 years without additional local aid. Local funding is essential to the completion of the TSM-type improvements as well as many of the major projects. It is strongly recommended that Missoula consider the local option gas tax and establishing a transportation utility as the most practical options for generating revenue for transportation system improvements.

Local maintenance revenues from the City's General Fund and the County Road and Bridge Fund should be used to accomplish the TSM-type improvements. The maintenance programs should identify which TSM projects will be accomplished in each year with a goal of completing all TSM improvements over a four or five year period. Each major improvement should be examined and the most appropriate local funding method identified and established to provide financing. Private developer fees should also be established and assessed to offset the financial burden of providing needed facilities. Cost-sharing options should not be overlooked whereby several government agencies, private developers, or benefited private interests pool financial resources to accomplish a project. Finally, improved cash flow management and creative debt financing will assure optimal use of existing revenues.

Chapter VIII: Summary of Recommended Improvements and Implementation

A. Recommended TSM Improvements

Chapter V of this report outlined 83 TSM-type improvements at a cost of $3,329,150. These improvements consist of the minor changes to the transportation system that are required to increase the effectiveness of the existing infrastructure. Improvements vary from approach lane widening at intersections to signing and striping to a signal maintenance program. Due to the nature of the TSM improvements, many can be implemented with local forces without going to contract. Other improvements require minor amounts of right-of-way or major planning and design.

This Transportation Plan recognizes the financial restraints on implementing major construction-type improvements and, therefore, has emphasized the transportation system management concept. No priorities have been assigned to the TSM improvements. It is expected that the local governing agencies can choose the most important improvements from the TSM list and proceed to implement these improvements immediately. Due to the nature and magnitude of most of the improvements, it is anticipated that the improvements will be implemented with local maintenance forces using the conventional maintenance funding mechanisms to satisfy the financial requirements. It is recommended that a program be established whereby the TSM projects would be scheduled for implementation over the next four or five years.

A listing of the recommended TSM improvements is presented in Table 9 and Figure 10, both found in Chapter V. A more detailed description of each TSM improvements in contained in Appendix A of this report.

Several of the TSM improvements are designed to provide immediate relief from an existing problem that is also addressed by a major network improvement. In these particular cases, it was felt both the short- and long-range solutions should be presented.

B. Recommended Major Network Improvements

A series of major roadway and bridge reconstruction projects were outlined in Chapter VI. A total of 19 major improvements are recommended in addition to six committed major projects with an estimated total cost of approximately $78 million. All of these improvements are considered desirable, if not absolutely necessary, to be implemented by the year 2010. The list of major projects was established based on future traffic needs. Unfortunately, limited financial resources require that the major improvements be prioritized.

The cost of all 19 improvements far exceeds the limited financial resources available within the 20-year planning period. Therefore, a tentative order of implementation was established by the Technical Advisory Committee. It is recommended this tentative order of projects remain flexible and be reviewed as part of the annual T.I.P. process. If traffic patterns change or unexpected growth occurs, the order of implementing the recommended improvements could then be revised to reflect the current needs of the Missoula area.

In Chapter VII the available funding sources were examined, and several alternate funding mechanisms discussed. The Federal Aid Urban (FAU) Fund has traditionally been relied on to finance major improvements within the study area. Assuming the current funding levels remain constant through the year 2010, the FAU Fund will generate approximately $20 million. Only minor support can be expected from the other Federal Aid Funds. It quickly becomes apparent that additional local funding will be required to close the gap between the cost of desired improvements and available funding.

In order to accelerate the major improvement program, it is recommended that local agencies adopt a policy of providing an additional $500,000 per year specifically earmarked for these major improvements to the transportation system. This will require the use of, perhaps, a local option gas tax, a general obligation bond issue, or the creation of a transportation utility. Without this additional funding, Missoula will only be able to complete the first three recommended improvements, in addition to those committed projects, between the present and the year 2010.

A listing of the recommended major network improvements is presented in Table No. 11. The improvements have been categorized into periods of 1) present to 2000; 2) 2000 to 2010; and 3) post-2010, based on the tentative order of implementation established by TAC. The time frames indicated in Table No. 11 are based on existing federal aid funding levels remaining constant and an additional $500,000 per year generated through local funding mechanisms, beginning in 1988. With the additional local fund, it is anticipated that all of the committed projects and the first eight recommended improvements could be accomplished by the year 2010.

Figure No. 15 shows the projected year 2010 traffic volumes resulting on the network from the implementation of the major network improvements.

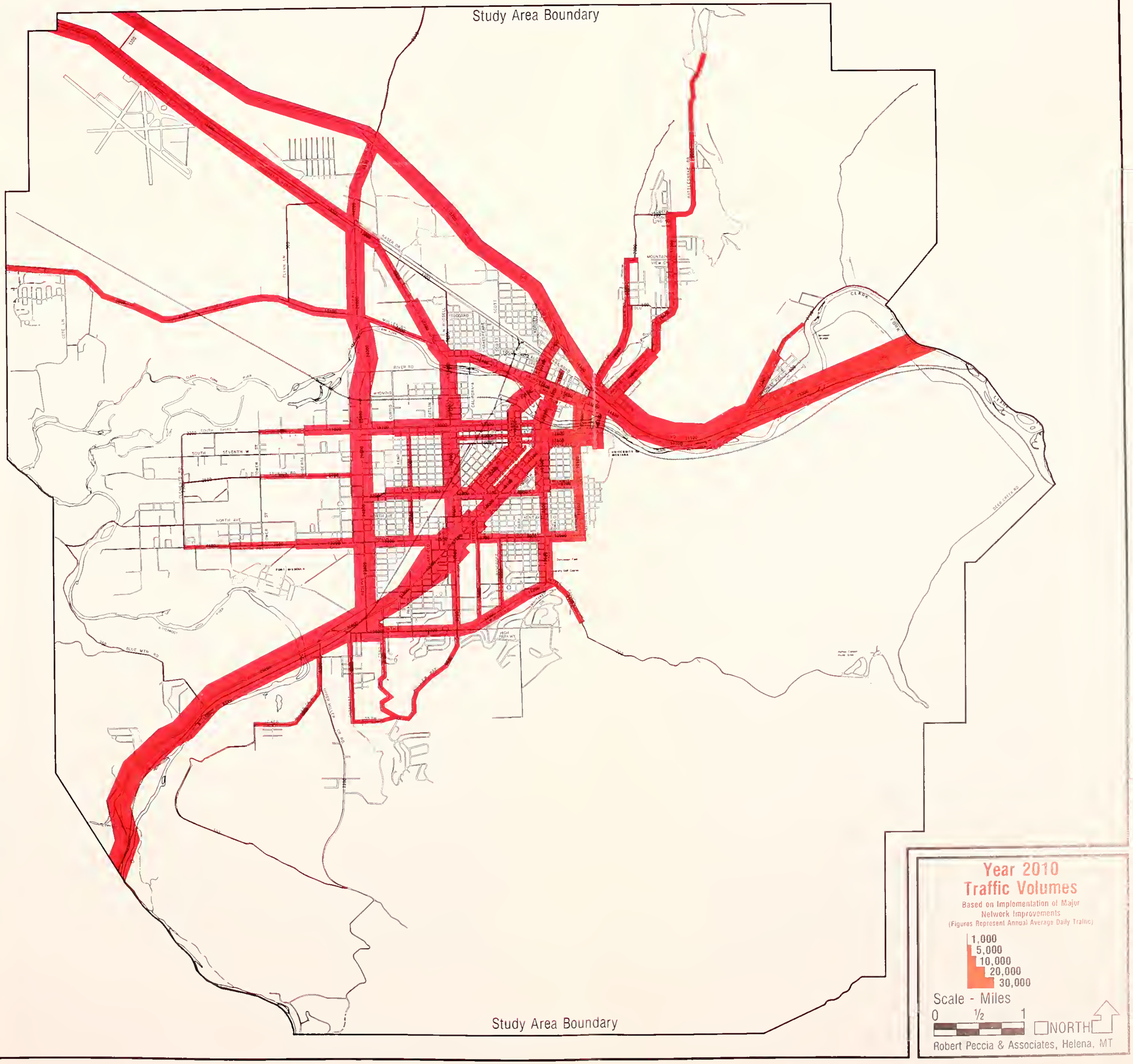
TABLE NO. 11

COMMITTED AND RECOMMENDED MAJOR NETWORK IMPROVEMENTS

(Time frame indicated is based on Federal Aid funding remaining at current levels and $500,000 per year of locally generated funds).

No.	Location	Possible Funding Source	Cost
	(Present - Year 2000)		
	Committed Improvements		
A.	Reserve St., So. Third W. to U.S. 93	Federal Aid Urban	$ 8,335,214
B.	So. Russell St., Mount Ave. to Brooks St.	State Maintenance Fund City Gas Tax Fund	114,000
C.	Mullan Rd., Flynn to Cote Lane	Federal Aid Secondary	4,531,150
D.	I-90, Van Buren to Bonner	Interstate 4-R	1,705,400
E.	Reserve St. Overpass	Reconstruction Trust Fund	128,000
F.	CBD Passenger Terminal	Urban Mass Transit Assistance	1,250,000
	Total Committed Improvements:		$16,063,764
	Recommended Improvements		
1.	Russell St., Mount to River Rd.	Federal Aid Urban Local Funds	$ 3,200,000
2.	Russell St. Bridge	Federal Bridge Rehabilitation Fund Federal Aid Urban County Bridge Fund	3,800,000
3.	Orange St., Stephens to River Rd.	Federal Aid Urban City Gas Tax Fund	1,300,000
4.	Orange St. Bridge	Federal Bridge Rehabilitation Fund Federal Aid Urban County Bridge Fund	5,000,000
	(Year 2000 - Year 2010)		
5.	South Ave., Reserve to Russell	Federal Aid Urban County Road Fund City Gas Tax Fund	2,500,000
6.	Brooks, Mount to Higgins	Federal Aid Primary	1,800,000
7.	So. Third St., Reserve to Russell	Federal Aid Urban City Gas Tax Fund	2,500,000
8.	Grade Separation of Brooks at South-Brooks-Russell	Federal Aid Primary Federal Aid Urban Local Funds	6,300,000
	(Post-Year 2010)		
9.	River Crossing in the Vicinity of Van Buren St.	County Bridge Fund	$ 3,700,000
10.	Orange St., Front to I-90	Federal Aid Urban City Gas Tax Fund	5,100,000
11.	Reserve St., So. Third to I-90	Federal Bridge Rehabilitation Fund Federal Aid Primary Federal Aid Urban County Road Fund City Gas Tax Fund	11,500,000
12.	Van Buren St., I-90 to Missoula Ave.	Federal Aid Urban City Gas Tax Fund	1,800,000
13.	Higgins Ave., Pattee Canyon Rd. to So. Ave.	Federal Aid Urban City Gas Tax Fund	1,300,000
14.	BN Bitterroot Spur Line	Local Funds	Unknown
15.	Southside Collector (39th and Higgins S.W.)	Federal Aid Urban City Gas Tax Fund County Road Fund	5,800,000
16.	Stephens, So. Ave. to Pattee Creek Dr.	City Gas Tax Fund	500,000
17.	Creek Crossing, Rattlesnake to Greenough	County Road	400,000
18.	Butler Creek Interchange	Interstate 4-R Private Funds	2,200,000
19.	CBD Parking Structure	Missoula Parking Structure	3,000,000
	Total Recommended Improvements:		$61,700,000
	Total Committed Improvements:		16,063,764
	Total Major Network Improvements:		$77,763,764

Figure 15: Year 2010 Traffic Volumes



References Cited

[1]Missoula Policy Guide for Urban Growth, 1975, Missoula Planning Board, Missoula, Montana.

[2]Kress, Mike, Acting Director, Office of Community Development, Missoula, Montana, personal communication, October 1, 1986.

[3]Highway Capacity Manual, Special Report 209, 1985, Transportation Research Board, National Research Council, Washington, D.C.

[4]Ibid.

[5]Financing Federal-Aid Highways, U.S. Department of Transportation, Federal Highway Administration, Washington, D.C., October 1983.

[6]Saindon, Patricia A., Bureau Chief, Transportation Bureau, Montana Department of Commerce, Helena, Montana, personal communication, January 6, 1987.

[7]Ibid.

[8]Ibid.

[9]Ibid.

[10]Anderson, Ray, Fiscal Programming Section Supervisor, Project Analysis Bureau, Program Development Division, Montana Department of Highways, personal communication, January 14, 1987.

[11]"Report to the 50th Legislature", Montana Highway Program, Montana Department of Highways, Helena, Montana, November 1986.

[12]Bingham, Keenan, Chief, Planning and Statistics Bureau, Montana Department of Highways, Helena, Montana, personal communication, January 5, 1987.

[13]City of Missoula Budget, Fiscal Year 1986-1987, Missoula, Montana, August 1986.

[14]Stearns, Chuck, Fiscal Analyst, City of Missoula, Missoula, Montana, personal communication, January 7, 1987.

[15]City of Missoula Budget, Fiscal Year 1986-1987, Missoula, Montana, August 1986.

[16]Stearns, Chuck, Finance Director, City of Missoula, Missoula, Montana, personal communication, January 7, 1987.

[17]Missoula County Budget, July 1, 1986 - June 30, 1987, Missoula, Montana, August 1986.

[18]Cox, Dan, Budget Officer, City of Missoula, Missoula, Montana, personal communication, January 7, 1987.

[19]Missoula County Budget, July 1, 1986 - June 30, 1987, Missoula, Montana, August 1986.

[20]Cox, Dan, Budget Officer, City of Missoula, Missoula, Montana, personal communication, January 7, 1987.

[21]Missoula County Budget, July 1, 1986 - June 30, 1987, Missoula, Montana, August 1986.

[22]Montana Petroleum Association, Billings, Montana, personal communication, January 13, 1987.

[23]McCracken, Robb, Planning Officer, Community Development Bureau, Local Government Assistance Division, Montana Department of Commerce, Helena, Montana, personal communication, January 9, 1987.

[24]Ibid.

Bibliography

Anderson, Ray, Fiscal Programming Section Supervisor, Project Analysis Bureau, Program Development Division, Montana Department of Highways, personal communication, January 14, 1987.

Bingham, Keenan, Chief, Planning and Statistics Bureau, Montana Department of Highways, Helena, Montana, personal communication, January 5, 1987.

Comprehensive Development Plan, 1967, Clark, Coleman, Rupeiks, Inc.

Cox, Dan, Budget Officer, City of Missoula, Missoula, Montana, personal communication, January 7, 1987.

Feasibility of Public Transit in Missoula, 1975, Bureau of Quantitative Studies, University of Montana, Missoula, Montana.

Financial Considerations in State Transportation Programs, U.S. Department of Transportation, Federal Highway Administration, Washington, D.C., June 1980.

Financing Federal-Aid Highways, U.S. Department of Transportation, Federal Highway Administration, Washington, D.C., October 1983.

Financing Urban Transportation Improvements, "Report 3: A Guide to Alternative Financing Mechanisms for Urban Highways", U.S. Department of Transportation, Federal Highway Administration, Washington, D.C., June 1984.

Funding Local Government Infrastructure, "A Report to the 50th Legislature", Joint Interim Subcommittee on Infrastructure, Montana Legislative Council, Helena, Montana, December 1986.

Grant Creek Road, Traffic Impact Study, 1981, Henningson, Durham and Richardson.

Highway Capacity Manual, Special Report 209, 1985, Transportation Research Board, National Research Council, Washington, D.C.

Hobbs, Geniesse, Montana Petroleum Association, Billings, Montana, personal communication, January 13, 1987.

Kress, Mike, Acting Director, Office of Community Development, Missoula, Montana, personal communication, October 1, 1986.

Manual of Traffic Engineering Studies, 1976, Institute of Transportation Engineers, Washington, D.C.

Master Plan Update and Noise Compatibility Program: Existing Conditions and Forecasts for Johnson-Bell Field, 1984, Peat, Marwick Mitchell and Co.

McCracken, Robb, Planning Officer, Community Development Bureau, Local Government Assistance Division, Montana Department of Commerce, Helena, Montana, personal communication, January 9, 1987.

Missoula Area Unified Work Program for Transportation Planning, 1985-1986, Missoula Office of Community Development, Missoula, Montana.

Missoula CBD Passenger Terminal Feasibility Study, Phase I and II, 1984, Basmaciyan-Darnell, Inc.

"City of Missoula Budget, Fiscal Year 1986-1987", Missoula, Montana, August 1986.

City of Missoula, Capital Improvements Program 1986-1990, City of Missoula, Missoula, Montana.

"Missoula County Budget, July 1, 1986 - June 30, 1987", Missoula, Montana, August 1986.

Missoula County, Capital Improvements Program 1986-1990, Missoula County, Missoula, Montana.

Missoula County Comprehensive Plan, 1975, Missoula Planning Board, Missoula, Montana.

Missoula County Population Analysis, 1983, Missoula Planning Board, Missoula, Montana.

Missoula Parking Study, 1957, Montana State Highway Commission, Planning Survey Division, Helena, Montana.

Missoula Policy Guide for Urban Growth, 1975, Missoula Planning Board, Missoula, Montana.

Missoula, Topics, 1973, V.T.N. Inc.

Missoula Transit Study, 1969, Clark, Coleman, Rupeiks, Inc.

Missoula Transportation Plan Update, Program Design, 1984, Robert Peccia & Associates, Helena, Montana.

Missoula Urban Area Highway Project Status Report, May 1985, Montana Department of Highways, Helena, Montana.

Missoula Urban Transportation Study Update, 1974, Daily-Peccia and Associates, Helena, Montana.

Montana Highway Program, "Report to the 50th Legislature", Montana Highway Commission, Helena, Montana, November, 1986.

Parking and Feasibility Study of the Central Business District, 1979, E.A. Barton & Associates.

Parking Development Plan, 1980, Clete Daily, Helena, Montana.

A Policy on Geometric Design of Highways and Streets, 1984, American Association of State Highway and Transportation Officials.

A Policy Guide for Urban Growth, 1975, Missoula Planning Board, Missoula, Montana.

"Report to the 50th Legislature", Montana Highway Program, Montana Department of Highways, Helena, Montana, November 1986.

Reserve Street Area Plan, 1980, Missoula Planning Office, Missoula, Montana.

Reserve Street - U.S. 93 to South Third Street Environmental Impact/ 4(f) Statement, 1984, Robert Peccia & Associates, Helena, Montana.

Saindon, Patricia A., Bureau Chief, Transportation Bureau, Montana Department of Commerce, Helena, Montana, personal communication, January 6, 1987.

Stearns, Chuck, Fiscal Analyst, City of Missoula, Missoula, Montana, personal communication, January 7, 1987.

Transit Development Plan, 1983-1988, John Grew.

Transportation and Traffic Handbook, 1976, Institute of Transportation Engineers, Washington, D.C.

Transportation Improvement Program, 1984-1988, Missoula Planning Board, Missoula, Montana.

Transportation Improvement Program/Annual Element, 1986-1990, Missoula Office of Community Development, Missoula, Montana.

Urban Transportation Study, 1965, Clark, Coleman, Rupeiks, Inc.

Urban Transportation Study, 1967, Clark, Coleman, Rupeiks, Inc.

Appendix A

Included in this appendix is a brief description of each recommended TSM improvement project. A summarization of the problem or deficiency, the recommended solution, an estimated cost, and possible funding sources are provided for each project. The cost shown is based on 1985 construction costs using the Montana Department of Highways Bid Tabulations as the basis for the unit prices used to develop these figures.

TSM: 1

Location: Mullan Road (Reserve to Flynn)

Problem: Lack of pedestrian/bicycle facilities along Mullan Road.

Recommendation: It should be noted that a major improvement project for Mullan Road is currently planned for construction in 1989. Under this project, Mullan Road will be upgraded to include 12-foot driving lanes and eight-foot paved shoulders which will accommodate emergency parking and pedestrian/bicycle traffic. This project begins at Flynn Lane and extends 5.3 miles west to Cote Lane. It is recommended that Mullan Road from Flynn Lane east to Reserve Street be upgraded to include four-foot paved shoulders to handle the pedestrian/bicycle traffic and provide system continuity.

Cost: $80,000

Maintenance Jurisdiction: County

Possible Funding Source: Federal Aid Secondary Funds
County Road Fund

TSM: 2

Location: Mullan Road (MP 2.9 - 3.1)

Problem: The accident history indicated that during the four and one-half year study period 14 accidents occurred at this location near Cemetery Hill. Most accidents were single vehicle accidents where the driver missed the curve and left the roadway.

Recommendation: Install a curve warning sign and 35 mph advisory speed plaque on the west approach and chevron warning signs along the south side of curve (chevrons to face both directions).

Cost: $2,600

Maintenance Jurisdiction: County

Possible Funding Source: Federal aid Secondary Funds
County Road Fund
Safety Funds

TSM: 3

Location: Mullan Road (MP 2.0 - 2.2)

Problem: The accident records reflect that 14 accidents occurred on or near the curve located west of Hellgate Store during the four and one-half year study period.

Recommendation: Install curve warning signs on east and west approaches and a series of reflectorized delineators along south side of curve (use double-faced delineators).

Cost: $750

Maintenance Jurisdiction: County

Possible Funding Source: Federal Aid Secondary Funds
County Road Fund
Safety Funds

TSM: 4

Location: Mullan Road (MP 0.9 - 1.1)

Problem: During the four and one-half year study period, ten accidents occurred along this curved section of Mullan. Most of the accidents involved westbound vehicles leaving the roadway in the curve.

Recommendation: Install a curve warning sign on the east approach and add four additional chevron signs to those existing on the north side of the curve.

Cost: $860

Maintenance Jurisdiction: County

Possible Funding Source: Federal Aid Secondary Funds
County Road Fund
Safety Funds

TSM: 5

Location: Reserve and Mullan

Problem: The accident history at this intersection indicated that 27 accidents occurred during the four and one-half year study period. Over half of the accidents involved vehicles approaching from the west colliding with north and southbound traffic.

Recommendation:
1. Replace existing intersection warning signs on west and south approaches with oversized signs.

2. Install oversized intersection warning sign on the north approach.

3. Cut back vegetation on the south side of the west approach.

Cost: $2,000

Maintenance Jurisdiction: City
County

Possible Funding Source: Federal Aid Secondary Funds
County Road Fund
City Gas Tax Fund

TSM: 6

Location: Reserve Street Bridge over the Clark Fork River

Problem: Twenty-two accidents occurred on the Reserve Street Bridge during the four and one-half year study period. Icy Road conditions were a factor in most of the accidents.

Recommendation: Roto-mill bridge deck and approaches to produce a rougher surface that will be less susceptible to the ice problem.

Cost: $23,300

Maintenance Jurisdiction: County

Possible Funding Source: Federal Aid Urban Funds
County Bridge Fund
Safety Funds

TSM: 7

Location: West Broadway and Mullan Road

Problem: This intersection is difficult to identify while approaching on Broadway.

Recommendation: Install guidance signs indicating Mullan Road on both east and west approaches on Broadway.

Cost: $530

Maintenance Jurisdiction: City (State Contract)

Possible
Funding Source: State Maintenance Funds

TSM: 8

Location: Broadway and Russell

Problem: Long vehicle delays occur at this intersection, primarily the left turn movement on the east approach. A double left turn movement would be desirable at this location but is impossible due to the two-lane bridge just south of the intersection on Russell.

Figure 16
TSM No. 9 - Broadway and Russell

Recommendation: See Figure 16.

1. Alter the raised median islands on the east approach to provide 500 feet of left turn bay. This would require a "right-turn-only" restriction at the Byron Street intersection.

2. Replace existing signal pole, arm, and heads for west approach with a new system that would provide two

signal heads over the through approach lanes and one signal head mounted on the pole for the right turn lane.

3. Change signal for the westbound left turn lane to provide a permissive left turn movement.

4. Retime the signal with a more aggressive timing.

Cost: $36,000

Maintenance Jurisdiction: City (State Contract)

Possible Funding Source: Federal Aid Primary Funds
State Maintenance Funds

TSM: 9

Location: Russell Street Bridge

Problem: Lack of bicycle facilities

Recommendation:

1. Increase maintenance efforts that will keep the existing sidewalks free of gravel and debris.

2. Plan for and provide bicycle lanes at time bridge is widened to four lane.

Cost: Planning required.

Maintenance Jurisdiction: --

Possible Funding Source: --

TSM: 10

Location: Broadway (Flynn to Bitterroot Branch Railroad Tracks)

Problem: This section of Broadway is a four-lane with raised median islands.

Recommendation: Install a roadway lighting system along this corridor.

Cost: $695,000

Maintenance Jurisdiction: City (State Contract)
City

Possible
Funding Source: Federal Aid Primary Funds
State Maintenance Funds

TSM: 11

Location: Scott, Toole, Spruce Intersection

Problem: The geometrics at this location cause delays for approach traffic on Spruce.

Figure 17
TSM No. 11 - Scott, Toole, Spruce

Recommendation: See Figure 17.

The predominant traffic flows at this location are north-south on Scott and east-west on Toole-Spruce. The present configuration does not give preference to the Spruce Street traffic. The intersection of these streets should be re-shaped to provide an unrestricted movement along the Toole-Spruce corridor. The east approach on Toole should be re-

aligned to intersect Spruce as a "T" intersection 200 feet east of Scott Street.

Cost: $46,500

Maintenance Jurisdiction: City

Possible Funding Source: Federal Aid Urban Funds
City Gas Tax Fund

TSM: 12

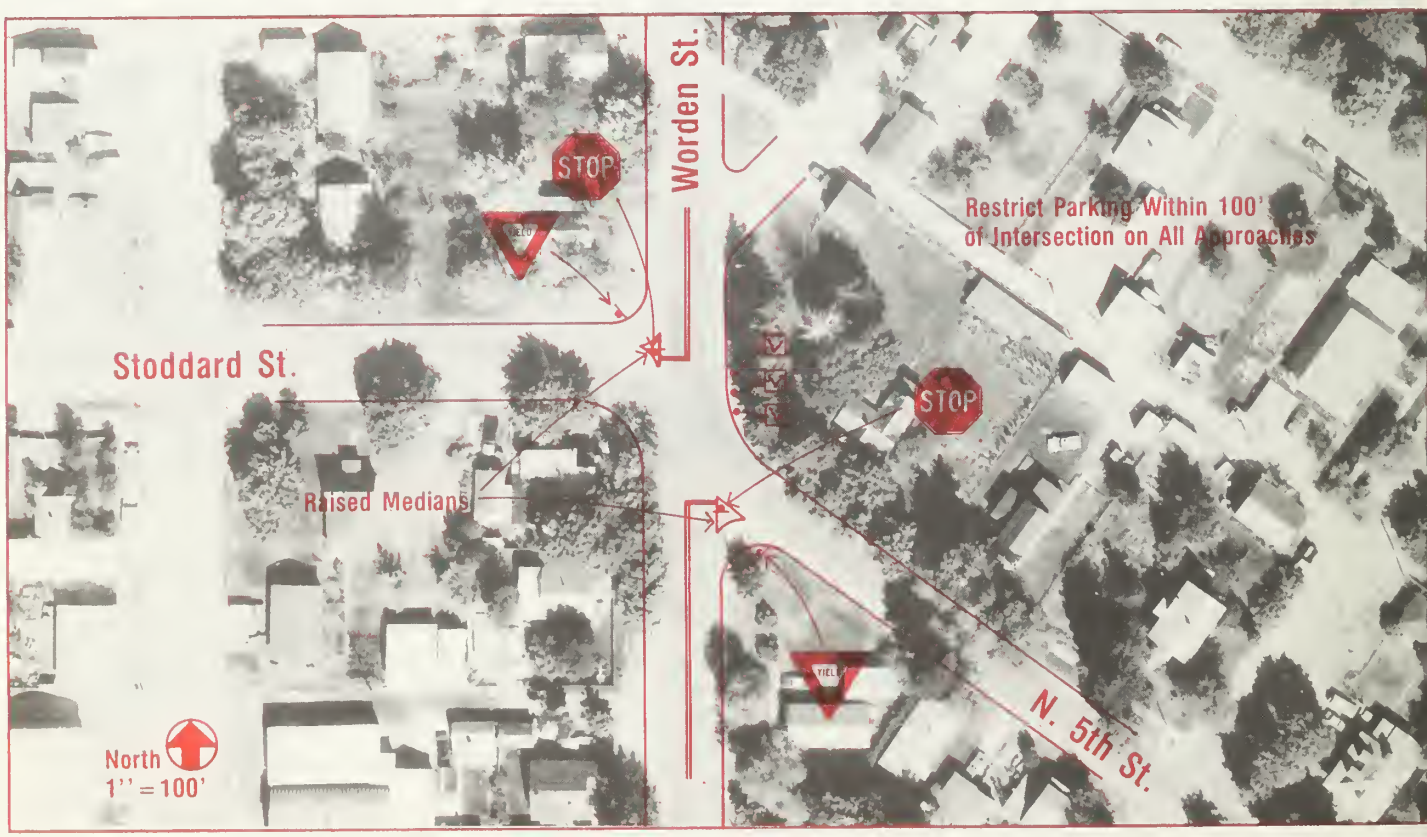
Location: Worden, Stoddard, and North Fifth

Problem: A sight distance problem exists at this location due to the geometrics of the intersection.

Recommendation: See Figure 18.

1. Install two triangular median islands on the north and south approaches thereby improving sight distance and geometrics.

Figure 18
TSM No. 12 - Worden, Stoddard, North 5th



2. Restrict parking within 100 feet of the intersection on all approaches.

3. Install three chevron signs on east side of the intersection.

Cost: $1,900

Maintenance Jurisdiction: City

Possible Funding Source: Federal Aid Urban Funds
City Gas Tax Fund

TSM: 13

Location: Orange Street Underpass

Problem: Lack of adequate bicycle facilities at this location.

Recommendation:

1. Adjust drainage gates (four) to improve bicycle safety.

2. At time in future when reconstruction of underpass is required, provide bicycle lanes in the new design.

Cost: $2,900

Maintenance Jurisdiction: City (State Contract)

Possible Funding Source: Federal Aid Urban Funds
State Maintenance Funds

TSM: 14

Location: Orange and Alder

Problem: The underpass immediately north of this intersection creates a sight distance problem which is impossible to correct without reconstructing the underpass.

Recommendation: Prohibit through and left turn movements from Alder. Channelize with raised medians similar to project completed at South and Washburn.

Cost: $5,600

Maintenance Jurisdiction: City (State Contract)

Possible Funding Source: Federal Aid Urban Funds
State Maintenance Funds

TSM: 15

Location: Orange - Main - Front

Problem: Long delays are experienced by the eastbound traffic at this location.

Recommendation:

1. Restripe the west approach to provide three approach lanes (LT, TH, TH/RT). This will require a minor alteration of the raised median island east of the intersection.

2. Install guidance sign on the median island on east approach identifying the left turn ramp that reroutes traffic back into the CBD.

3. The sewer grate on the northwest corner should be adjusted up to the present pavement level.

4. Retime signal.

Cost: $2,100

Maintenance Jurisdiction: City (State Contract)
City

Possible Funding Source: Federal Aid Urban Funds
State Maintenance Funds
City Gas Tax Fund

TSM: 16

Location: Orange Street Bridge

Problem: The lack of adequate bicycle facilities on the bridges and the sight distance limitations at the Cregg Lane access were identified as problems at this location.

Recommendation:

1. At the time the bridge is reconstructed to a four-lane, provide for bicycle lane in the new design.

2. At the time the mill shuts down, close off the Cregg Street access and require the new tenants to conduct a traffic impact study.

Cost: Planning required.

Maintenance Jurisdiction: --

Possible Funding Source: --

TSM: 17

Location: Pine Street (Woody to Ryman)

Problem: There is a need for a midblock pedestrian crossing at this location between the County Courthouse and the City-County Building.

Recommendation: Install a painted pedestrian crosswalk at this location including overhead warning signs. This will require restricting parking on the south side of Pine for a short distance (three spaces) to provide adequate sight distance.

Cost: $3,500

Maintenance Jurisdiction: City

Possible Funding Source: City Gas Tax Fund
MRA

TSM: 18

Location: Main and Ryman

Problem: The accident records indicate that during the four and one-half year study period 12 accidents occurred at this location, the majority of which involved northbound vehicles colliding with westbound traffic. This is most likely caused by a sight distance limitation on the southeast corner.

Recommendation:

1. Remove and relocate mail box and newspaper stands on southeast corner.

2. Restrict parking on the south side of Main Street 50 feet back from intersection on the southeast corner of the intersection. Four existing parking spaces will have to be removed.

Cost: $450

Maintenance Jurisdiction: City

Possible
Funding Source: City Gas Tax Fund
MRA

TSM: 19

Location: Front and Ryman

Problem: Sight distance is limited on the north approach looking west. This is caused by the vehicles parked on the north side of Front Street.

Recommendation: Restrict parking on north side of Front Street west of the intersection (five spaces).

Cost: $550

Maintenance
Jurisdiction: City

Possible
Funding Source: City Gas Tax Fund
MRA

TSM: 20

Location: Main - Front One Way Couplet

Problem: There is a need to better identify the one way condition.

Recommendation: Install printed directional arrows on the pavement on both sides of all intersections on the one way loop. Markings should be placed approximately 50 feet from the intersections.

Cost: $6,400

Maintenance
Jurisdiction: City

Possible
Funding Source: City Gas Tas Fund
MRA

TSM: 21

Location: West Island and Caras Parking Lots

Problem: These parking areas constitute a large portion of the CBD off-street parking supply. Unfortunately, there is only limited access and poor signing informing the public of their existences.

Recommendation:

1. Install large informational signs on Front Street indicating the presence of the public lots along the river. This signing is expected to be accomplished by the Missoula Redevelopment Agency (MRA) as part of the current construction project which includes reconstruction of the Ryman Street access.

2. As property owners change along the south side of Front Street, additional access to the parking lots should be established.

Cost: Planned required

Maintenance Jurisdiction: --

Possible Funding Source: --

TSM: 22

Location: Higgins (Front to Spruce)

Problem: The four and one-half year accident history indicates the following about this portion of the Higgins Street corridor.

Higgins & Spruce		10 ACC
Higgins & Pine	18 ACC	
Higgins & Broadway		43 ACC
Higgins & Main		31 ACC
Higgins & Front	21 ACC	
Total		123 ACC

Recommendation: A similar accident history exists at all five of the signalized intersections along Higgins in the CBD. The present signal configuration at each intersection includes only one signal head over the driving lanes and one signal head mounted on the signal pole to the right of the intersections. It is recommended that an additional signal head over the driving lanes be installed on each mast arm for the north-south approaches.

Cost: $8,500

Maintenance Jurisdiction: City (State Contract)
City

Possible Funding Source: State Maintenance Funds
City Gas Tax Fund
Safety Funds

	Federal Aid Urban Funds MRA

TSM:	23
Location:	Pine Street Medians (east of Pattee)
Problem:	The 24-foot-wide medians along Pine Street restrict traffic flow by creating a narrow corridor between the median curb and parked vehicles. During winter months, snow removal is severely hampered by the median islands. Numerous sideswipe accidents have occurred along this three-block-long section of Pine Street, all of which were at least indirectly affected by the raised medians.
Recommendation:	Remove the three large raised median islands located on Pine Street. Curb parking should then be changed to angle parking along the north side of Pine Street.
Cost:	$163,000
Maintenance Jurisdiction:	City
Possible Funding Source:	City Gas Tax Fund MRA

TSM:	24
Location:	CBD Delivery System
Problem:	The practice of double-parking or parking in the center of the street by delivery vehicles is common in the CBD area. This situation is unsafe and often causes traffic congestion.
Recommendation:	Due to the lack of an adequate alley system in most blocks within the CBD, on-street deliveries appear to be a necessary evil associated with doing business in the downtown area. In an effort to minimize the adverse affects of deliveries on traffic, an ordinance should be passed which would restrict on-street deliveries within the CBD to loading zones only between the hours of 9:00 a.m. and 6:00 p.m.
Cost:	Planning required
Maintenance Jurisdiction:	--
Possible Funding Source:	--

TSM: 25

Location: CBD On-Street Parking

Problem: The on-street parking demand within the CBD is anticipated to continue to outpace the supply in the coming years. Restructuring the parking layout on several blocks will provide additional spaces while providing continuity to the overall CBD on-street parking system.

Recommendation:

1. Woody Street - stripe west side for parallel parking and east side for angle parking.

2. Ryman Street - stripe west side for angle parking and east side for parallel parking.

3. Spruce Street (Orange to Ryman) - stripe north side for angle parking; (Pattee to Washington) - stripe north side for angle parking

4. Pine Street (Orange to Woody) - stripe north side for angle parking; (Pattee to Washington) - remove median and stripe north side for angle parking (see TSM 25 for cost).

The result would be a net increase of approximately 40 on-street parking spaces.

Cost: $33,300

Maintenance Jurisdiction: City

Possible Funding Source: City Gas Tax Fund
MRA

TSM: 26

Location: Greenough Hill

Problem: The combination of high vehicle speeds and poor roadway alignment results in a potentially hazardous situation on Greenough Hill.

Recommendation:

1. The alignment of the road just north of the Interstate underpass should be straightened by shifting the west side guard rail to the west and adding to the pavement on the inside of the curve. Minor storm sewer adjustments will be required.

2. The speed limit on Duncan Road is posted 25 mph which is appropriate for Greenough Hill. Most motorists travel at approximately 35 mph down the hill. A 25 mph

speed limit sign should be mounted half way down the hill and enforcement measures increased.

Cost: $4,800

Maintenance Jurisdiction: City

Possible Funding Source: City Gas Tax Fund

TSM: 27

Location: Broadway and Madison

Problem: Long delays are experienced on both the north and east approaches to this intersection.

Recommendation: See Figure 19.

1. Restrict parking on both sides of the north approach back 200 feet from the intersection.

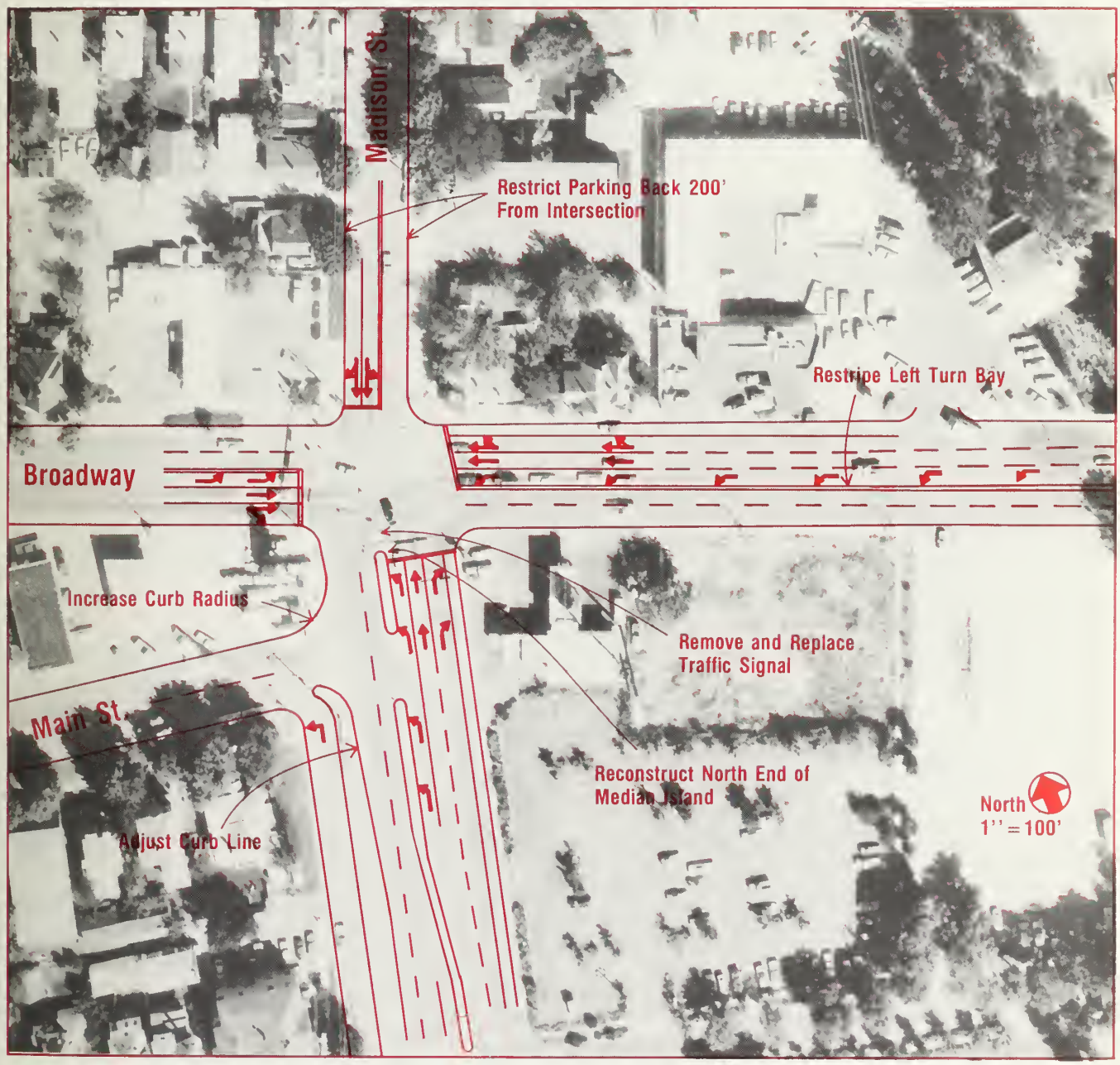
2. Restripe the east approach to accommodate a 300-foot left turn bay.

3. Remove signal pole for east and southbound traffic and install a new pole and mast arm assembly on the raised median island 20 feet south of the existing pole location. The new signal assembly should provide two signal heads over the eastbound traffic lanes and one on the pole.

This signal pole at Broadway and Madison should be removed and a new signal pole installed 20 feet to the south and the median island reconstructed.

4. The raised median island and west curb line south of the intersection should be reconstructed to widen the southbound throat opening. This can be accomplished by eliminating the northernmost 20 feet of the center island, increasing the radius of the west curb line onto Main Street and pushing back the west curb line on the median south of Main Street.

Figure 19
TSM No. 27 - Broadway and Madison



Cost:	$23,900
Maintenance Jurisdiction:	City (State Contract)
Possible Funding Source:	Federal Aid Primary Funds State Maintenance Funds

---

TSM:	28
Location:	Front and Madison
Problem:	The present configuration of median islands and crosswalks do not adequately provide for eastbound bicyclists in crossing Madison Street.
Recommendation:	1. Minor modifications to the westernmost median island should be made so bicyclists can cross it. A defined crossing for the eastbound bicyclists should be provided. 2. The southernmost end of the west median island on Madison should be extended 50 feet to the south using pin-down curbing.
Cost:	$2,400
Maintenance Jurisdiction:	City (State Contract)
Possible Funding Source:	State Maintenance Funds

TSM:	29
Location:	Broadway (One-Half Block East of Van Buren Street)
Problem:	This half block section of Broadway has a raised median island but no roadway lighting.
Recommendation:	Install roadway lighting along this one-half block section of Broadway
Cost:	$15,400
Maintenance Jurisdiction:	State
Possible Funding Source:	Federal Aid Urban Funds State Maintenance Funds

---

TSM: 30

Location: East Broadway and I-90

Problem: A four and one-half year accident history at this location indicates that 18 accidents were reported, of which two-thirds occurred at night.

This curve on East Broadway should be delineated with a series of chevron signs.

Recommendation:

1. Remove the existing directional arrows and install a series of chevron warning signs for both east and westbound traffic along the outside of the curve south of the railroad underpass.

2. Remove the two existing curve warning signs and install similar oversized signs and advisory speed plaques. The sign for the westbound traffic should be installed in the same location as the existing sign while the sign for the eastbound traffic should be installed 750 feet west of the curve.

3. The object marker signs at the railroad underpass should be reset to better identify the most protruding portions of the structure.

4. The railroad underpass should be widened at some time in the future when reconstruction of the structure is required (no cost provided).

Cost: $3,900

Maintenance Jurisdiction: State

Possible Funding Source: State Maintenance Funds
Safety Funds
Federal Aid Urban Funds

TSM: 31

Location: I-90 - East Missoula Interchange

Problem: The accident records indicate that 23 accidents occurred at this location during the four and one-half year study period. The majority of the accidents occurred on the westbound on-ramp. The accidents were typically at night involving a single vehicle leaving the roadway.

Recommendation:

1. Reconstruction the westbound on ramp to provide less of a curved alignment. The straightening of the initial curve section can be accomplished by filling and paving the inside of the curve.

2. Install a series of reflectorized delineators along both sides of the entire westbound on-ramp.

Cost: $19,000

Maintenance Jurisdiction: State

Possible Funding Source: Interstate 4-R Funds

TSM: 32

Location: South Third and Clements

Problem: Twelve accidents were reported at this location during the four and one-half year study period. The roadway alignment combined with limited sight distance in the curve is the source of the problem.

Recommendation:

1. Trim the roadside vegetation along the north side of Third Street and on the inside of the curve and realign the chevron warning signs so they are more visible on both approaches. Four additional chevron signs will be required to achieve the desired visual effect.

2. The outside of the curve should be made safer by relocating any fixed objects (i.e., mail boxes and street signs) and flattening the outside shoulder slope to 6:1. This will require enclosing a portion of

the irrigation ditch that is located west of the curve.

3. The ultimate solution to this alignment problem involves the acquisition of right-of-way and reconstruction of the roadway on a better alignment. Planning efforts should be initiated to acquire the necessary right-of-way (cost not included).

Cost: $17,400

Maintenance Jurisdiction: County

Possible Funding Source: County Road Funds
Safety Funds

TSM: 33

Location: South Third and Tower

Problem: The deep irrigation ditch on both sides of Third Street on the east side of Tower Street constitutes a potential safety problem.

Recommendation:

1. On the north side of Third Street the irrigation ditch should be completely enclosed and the ditch filled flush with the surrounding ground. The guard rail on the northeast corner can then be eliminated.

2. The culvert under Third Street should be extended 50 feet to the southeast and the roadway shoulder flattened to a 6:1 slope.

Cost: $21,400

Maintenance Jurisdiction: County

Possible Funding Source: County Road Fund
County Bridge Fund
Federal Aid Urban Funds

TSM: 34

Location: South Third and Reserve

Problem: This intersection is operating at capacity with long delays occurring on the east, west, and south approaches.

Recommendation:

1. Relocate seven power poles and widen the pavement 12 feet on the south side of Third Street. Widening should extend back 300 feet on both the east and west approaches the full 12-foot width, then tapered to meet the existing roadway. Striping should provide a 250-foot long exclusive left turn bay on the east approach and a 100-foot long left turn bay on the west approach.

2. Remove and replace box culvert on south approach and widen the approach 12 feet to accommodate an exclusive left turn bay 100 feet long and a through/right lane.

Cost: $83,000

Maintenance Jurisdiction: County
City

Possible Funding Source: Federal Aid Urban Funds
County Road Fund
County Bridge Fund
City Gas Tax Fund

TSM: 35

Location: South Third and Catlin

Problem: Pedestrians crossing Third at this location traveling to and from the shopping center need a crossing facility.

Recommendation: Install a painted crosswalk on the east side of the Third and Catlin intersection. Approximately 180 feet of sidewalk should be installed, 30 feet on the northside of Third and 120 feet on the southeast corner of the intersection. Advance crosswalk signing should be installed on both approaches on Third Street.

Cost: $3,900

Maintenance Jurisdiction: City (State Contract)

Possible Funding Source: State Maintenance Funds

TSM: 36

Location: Russell Street Underpass

Problem: There are only limited facilities for pedestrians and bicyclists at this location.

Recommendation:

1. Acquire the necessary right-of-way to provide an eight-foot-wide paved surface crossing of the railroad tracks on each side of the underpass.

2. The ultimate solution to this problem is to eliminate the underpass since the railroad line has been essentially abandoned. It is anticipated that the underpass structure would be removed at such time when Russell Street is widened to a four-lane facility.

Cost: $10,800 (does not include right-of-way)

Maintenance Jurisdiction: County

Possible Funding Source: County Road Fund

TSM: 37

Location: Fourth and Walnut

Problem: This intersection does not have any traffic control and has a high accident history.

Recommendation: Install stop signs on the north and south approaches on Walnut.

Cost: $450

Maintenance Jurisdiction: City

Possible Funding Source: City Gas Tax Fund

TSM: 38

Location: Third and Orange

Problem: This intersection is operating at or near capacity with long delays on the north and south approaches.

Recommendation:

1. The north and south approaches should be widened to accommodate exclusive left turn bays. This can be accomplished by taking approximately seven feet from the 12-foot-wide boulevard on the west side of Orange Street. Widening should begin and end at the midblock alley entrances.

2. Parking should be restricted within 150 feet of the intersection on the south side of Third Street, east of Orange Street.

Cost: $15,500

Maintenance Jurisdiction: City (State Contract)

Possible Funding Source: Federal Aid Urban Funds
State Maintenance Funds

TSM: 39

Location: Stephens and Orange

Problem: The transition on Stephens from four lanes to two lanes occurs just west of the curve at Stephens and Orange. The combination has presented a problem to northbound motorists resulting in numerous accidents where vehicles miss the curve and impact the spruce trees along the east side of Orange Street.

Recommendation:

1. Install two overhead signs for the northbound traffic on Stephens. A curve warning sign and a 25 mph advisory speed plaque should be located 500 feet back from the curve and a "Right Lane Ends" warning sign installed 1,000 feet from the curve. These overhead signs will be much more effective than the present signs mounted on the far right side of the road. A standard post-mounted curve warning sign and 25 mph advisory speed plaque should be installed on the north approach to the curve.

2. Florence Street, which intersects Stephens in the curve,should be converted to one-way usage traveling away from Stephens.

3. Parking should be restricted on the south side of Stephens for 100 feet west of the Florence Street intersection.

4. The curb radius on the inside of the curve should be increased to provide for a smoother flow of traffic southbound.

Cost: $15,800

Maintenance Jurisdiction: City (State Contract)

Possible Funding Source: Federal Aid Urban Funds
State Maintenance Funds

TSM: 40

Location: Stephens (Orange to Mount)

Problem: This section of Stephens is extremely wide with approximately 20 feet of dirt between the travel lanes and the curb line. This creates air pollution problems as well as signing and channelization problems.

Recommendation: Stephens, which is paved to accommodate four lanes of traffic, should be modified with the installation of pin-down curbing along both sides of the four-lane roadway creating a channelized corridor along Stephens and one-way frontage roads for local traffic and parking on both sides.

Cost: $88,500

Maintenance Jurisdiction: City (State Contract)

Possible Funding Source: Federal Aid Urban Funds
State Maintenance Funds

TSM: 41

Location: Stephens (Orange to Brooks)

Problem: This section of Stephens is to be modified with curbing that will delineate the four-lane facility, creating one-way frontage roads on each side. There is no street lighting on this portion of Stephens.

Recommendation: Install a roadway lighting system along this corridor.

Cost: $242,000

Maintenance Jurisdiction: City (State Contract)

Possible Funding Source: Federal Aid Urban Funds
State Maintenance Funds

TSM: 42

Location: Higgins (Third to Brooks)

Problem: This section of Higgins is 56 feet wide and striped to accommodate four travel lanes with parallel parking on both sides. During the peak periods of travel, Higgins becomes very congested, mostly due to the narrow driving lanes and minimal lateral clear distance to parked vehicles.

Parking along this portion of Higgins should be prohibited during peak travel hours.

Recommendation:	Restrict parking along both sides of Higgins from Third to Brooks during the peak driving hours of 7:00 a.m. to 9:00 a.m. and 4:00 p.m. to 6:00 p.m. This restriction will not only improve the traffic flow characteristics but also provide space for bicycle commuters.
Cost:	$2,600
Maintenance Jurisdiction:	City (State Contract)
Possible Funding Source:	State Maintenance Funds

TSM:	43
Location:	Sixth and Higgins
Problem:	The accident history at this location indicates 29 accidents occurred at this intersection during the four and one-half year study period. Most of these accidents were angle accident involving approach traffic on the north and west legs. The view of the intersection's traffic signal from the north approach is somewhat overpowered by the guidance signs to the south indicating the Brooks Street Intersection.
Recommendation:	Remove the existing signal standards for the north and south approaches and replace them with standards capable of

supporting two signal heads over the travel lanes and one signal head located on the signal standard.

Cost: $20,900

Maintenance Jurisdiction: City (State Contract)

Possible Funding Source: Federal Aid Urban Funds
State Maintenance Funds

TSM: 44

Location: Sixth and Maurice

Problem: This intersection has limited sight distance from the south approach. The west approach is one-way and striped and signed for a double left turn movement at the intersection. Lane use and turning movement conflicts occur at this location.

Recommendation:

1. The sight distance on the south approach is restricted by the boulevard trees and parked vehicles along the south side of Sixth on the west approach. Remove the trees and parking within 100 feet of the intersection.

2. Install overhead signs defining the lane usage on the west approach. To be effective, the overhead canopy of tree limbs must be trimmed.

3. Lane use arrows should be used on the west approach as well as an eight-inch-wide solid center line stripe that begins 100 feet before the intersection and continues around the corner and 100 feet to the north on Maurice.

Cost: $7,500

Maintenance Jurisdiction: City (State Contract)
City

Possible Funding Source: State Maintenance Funds
City Gas Tax Fund

TSM: 45

Location: Fifth and Maurice

Problem: This location is congested during peak travel periods. Much of the congestion is caused by the alignment of the bridge

approach. There is also a sight distance problem on the southeast corner which makes entering at Fifth Street difficult.

Recommendation:

1. The curb line on the northwest corner of this intersection should be reconstructed so the throat of the bridge approach is approximately six feet wider at the Fifth Street intersection.

2. Lane use pavement arrows and a solid eight-inch-wide centerline stripe should be used. The solid centerline stripe should begin 100 feet south of the intersection and continue north through the curve section of the bridge approach.

3. To reduce the sight distance problem, the parking should be restricted along the east side of Maurice between Fifth and Sixth.

Cost: $5,900

Maintenance Jurisdiction: City (State Contract)
City

Possible Funding Source: State Maintenance Funds
City Gas Tax Fund

TSM: 46

Location: Eddy and Ronald

Problem: Nine angle accidents occurred at this intersection during the four and one-half year study period. There are no forms of traffic control at this intersection.

Recommendation: Install stop signs and stop bars on the north and south approaches on Ronald.

Cost: $450

Maintenance Jurisdiction: City

Possible Funding Source: City Gas Tax Fund

TSM: 47

Location: South Seventh and Reserve

Problem: Twenty-six accidents occurred at this intersection during the four and one-half year study period.

Recommendation:

1. Install "Stop Ahead" signs on both east and west approaches.

2. Relocate the stop sign on the east approach so it is clearly visible to the westbound vehicles on Seventh. Painted stop bars should be used on both east and west approaches.

3. The local sight distance triangle ordinance should be enforced to push back the leading edge of the corn field on the northeast corner.

Cost: $550

Maintenance Jurisdiction: County

Possible Funding Source: County Road Fund

TSM: 48

Location: Reserve and Spurgin

Problem: The accident history at this intersection indicates that 37 accidents occurred during the four and one-half year study period.

Recommendation:

1. Trim back the tree on the northeast corner which blocks the driver's view of the stop sign. To improve sight distance, the trees on the east side of the south approach should also be trimmed back.

2. The guard rails over the irrigation ditch should be extended to the south 50 feet and flared out. The guard rail ends on the north side of the ditch should be wrapped around the radius of the intersection.

3. The object marker signs on the south end of the west guard rail is missing and should be replaced.

4. Painted stop bars should be used on both east and west approaches.

Cost: $2,700

Maintenance Jurisdiction:	County
Possible Funding Source:	County Road Fund County Bridge Fund

TSM:	49
Location:	Tenth and Garfield
Problem:	During the four and one-half year study period, ten accidents occurred at this intersection. All were angle accidents, and nine occurred during daylight conditions on dry pavement. There are no forms of traffic control at this intersection.
Recommendation:	Install stop signs and stop bars on the north and south approaches on Garfield.
Cost:	$450
Maintenance Jurisdiction:	City
Possible Funding Source:	City Gas Tax Fund

TSM:	50
Location:	14th and Johnson
Problem:	This intersection had 17 accidents occur during the four and one-half year study period with an accident rate of 2.76 ACC/MVE. Almost all of the accidents occurred during daylight conditions on dry pavement.
Recommendation:	1. Replace existing stop signs with oversized signs. 2. Install painted stop bars on both stop approaches. 3. Eliminate the sight distance problem by removing four of the trees on the northwest corner, trimming the shrubs on the southwest corner and restricting parking on the south side of 14th for 100 feet east of the intersection. 4. Relocate speed limit sign on northeast corner 100 feet to the north on Johnson.
Cost:	$2,050

Maintenance Jurisdiction:	City
Possible Funding Source:	City Gas Tax Fund Safety Funds

TSM:	51
Location:	Russell (South Avenue to Broadway)
Problem:	This section of road is in very poor condition and has no provisions for bicyclists.
Recommendation:	There is little that can be done with a TSM type of improvement that will correct this situation. It is recommended that bicycle facilities be included in the design when this road is upgraded to a four-lane facility.
Cost:	Planning required.
Maintenance Jurisdiction:	--
Possible Funding Source:	--

TSM:	52
Location:	Mount/Edith/Harlem
Problem:	The unique intersection geometrics at this location were questioned as to safety and effectiveness.
Recommendation:	The Edith/Mount and Harlem/Mount intersections are approximately 200 feet apart and function well with a reasonable alignment and adequate sight distance. The intersection of Edith and Harlem has no form of traffic control while sight distance is often impaired by parked school buses. Stop signs should be installed on the north and south approaches on Edith.
Cost:	$335
Maintenance Jurisdiction:	City
Possible Funding Source:	City Gas Tax Fund

TSM: 53

Location: Mount/Park/Franklin/Plymouth

Problem: The unique intersection geometrics at this location were questioned with respect to safety and effectiveness.

Figure 20
TSM No. 53 - Mount, Park, Franklin, Plymouth

Recommendation: See Figure 20.

This intersection should be reconstructed so Franklin and Plymouth intersect north of Mount to form a "Y" intersection. The south leg of the "Y" intersection should intersect Mount across from the Park Street approach.

Cost: $15,300

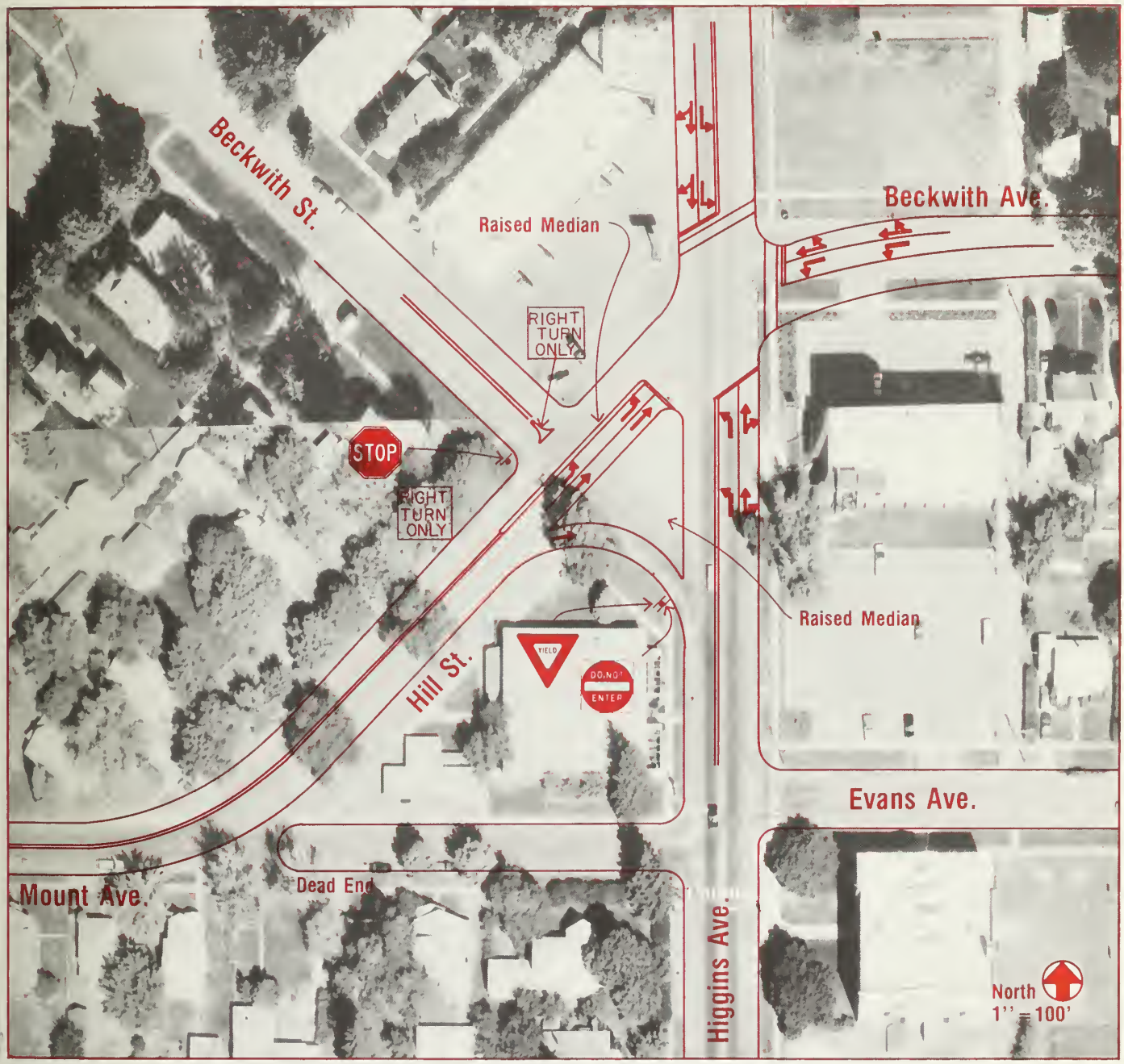
Maintenance Jurisdiction: City

Possible Funding Source: City Gas Tax Fund

TSM: 54

Location: Higgins/Beckwith/Hill/Mount

Figure 21
TSM No. 54 - Higgins, Beckwith, Hill, Mount



Problem: The Mount/Beckwith east-west corridor has recently gained importance by the addition of three signals on Mount. As traffic increases on Mount, the intersection at Higgins/ Mount/Beckwith will become intolerable. The intersection

geometrics must be altered in favor of a more efficient design that can one day be signalized.

Recommendation: Figure 21 depicts the recommended realignment of the intersection. Mount would be rerouted onto Hill while to the east Beckwith would angle south to best align with the west approach. The greatest adverse traffic impact will be felt on Beckwith northwest of the new intersection. The northwest approach on Beckwith should be restricted to right turn movements only to minimize the vehicle conflicts west of the intersection.

Cost: $166,000

Maintenance Jurisdiction: City (State Contract)
City

Possible Funding Source: Federal Aid Urban Funds
State Maintenance Funds
City Gas Tax Fund

TSM: 55

Location: Ronald and Evans

Problem: There have been numerous citizen complaints about this uncontrolled intersection. It appears that several angle accidents and many near misses have occurred at this location.

Recommendation: It is recommended that stop signs be installed on the north and south approaches on Ronald.

Cost: $450

Maintenance Jurisdiction: City

Possible Funding Source: City Gas Tax Fund

TSM: 56

Location: North and Russell

Problem: The west approach to this intersection experiences long delays during peak periods.

Recommendation: 1. Restrict parking back 150 feet on the south side of the west approach and stripe the approach for two

lanes of traffic (a left/through lane and an exclusive right lane).

2. It should be noted that, according to a preliminary signal warrant check, this intersection does meet warrants 2 and 9. Consideration of a signal at this location should be postponed until Russell is expanded to a four-lane facility.

Cost: $400

Maintenance Jurisdiction: City (State Contract)
City

Possible Funding Source: State Maintenance Funds
City Gas Tax Fund

TSM: 57

Location: South and Reserve

Problem: This intersection is operating at capacity and experiences long delays on all approaches.

Recommendation: South Avenue should be widened so two 12-foot approach lanes can be accommodated on both approaches. The South Avenue approaches should then be striped for an exclusive left turn lane and a shared through/right lane. To avoid expensive signal and power pole relocation, the necessary pavement widening should be obtained from equal widening of both the north and south sides of South Avenue.

Cost: $22,900

Maintenance Jurisdiction: County

Possible Funding Source: Federal Aid Urban Funds
County Road Fund

TSM: 58

Location: South (Russell to Reserve)

Problem: This section of roadway is narrow with poor pavement condition making bicycle travel difficult.

Recommendation:	There is little that can be done along South Avenue to aid the bicyclist without major street widening and reconstruction. It is recommended that when South Avenue is upgraded that bicycle lanes be provided.
Cost:	Planning required.
Maintenance Jurisdiction:	--
Possible Funding Source:	--

TSM:	59
Location:	South and Johnson
Problem:	Approach traffic on Johnson trying to negotiate this intersection experiences long delays.
Recommendation:	1. Widen the north approach enough to accommodate two approach lanes. 2. Widen the pavement on the west approach of South Avenue enough to provide a 12-foot left turn bay. The pavement widening should continue to the east over the tracks to provide for the eastbound through traffic movement. This will require relocating the railroad crossing signal and widening the at-grade crossing.
Cost:	$23,000
Maintenance Jurisdiction:	County
Possible Funding Source:	County Road Fund

TSM:	60
Location:	South and Garfield
Problem:	Long delays occur on the north and south approaches on Garfield.
Recommendation:	Parking should be restricted back 150 feet from the intersection on both the north and south approaches. The approaches should then be striped to provide two 12-foot approach lanes.
Cost:	$550

Maintenance Jurisdiction: City

Possible Funding Source: City Gas Tax Fund

TSM: 61

Location: South and Stephens

Problem: The lack of adequate gap availability on South Avenue and traffic congestion causes long delays on the north and south approaches of this intersection.

Recommendation:
1. Convert to four-way stop control at this intersection.
2. Stripe north approach for two approach lanes.
3. Stripe South Avenue with 12-foot left turn bays on both east and west approaches.

Cost: $950

Maintenance Jurisdiction: City (State Contract)
City

Possible Funding Source: State Maintenance Funds
City Gas Tax Fund

TSM: 62

Location: South and Bancroft

Problem: Long delays are experienced on both Bancroft approaches to this intersection.

Recommendation:
1. Restrict parking back to the alley on both sides of Bancroft on both north and south approaches.
2. Restrict parking back 150 feet on the east approach.
3. Restripe all four approaches with exclusive left turn bays and shared through/right lanes.

Cost: $1,800

Maintenance Jurisdiction: City (State Contract)
City

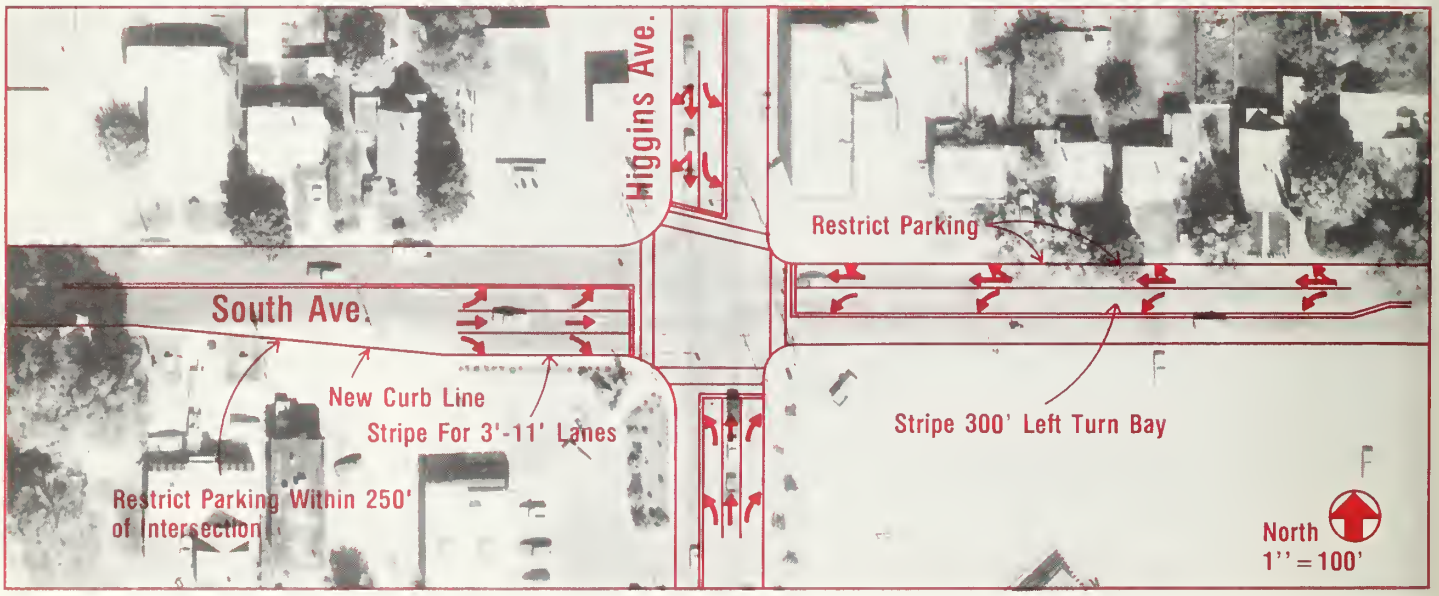
Possible
Funding Source: State Maintenance Funds
City Gas Tax Fund

TSM: 63

Location: South and Higgins

Problem: This intersection is operating at service level D and experiences long delays on the east and west approaches.

Figure 22
TSM No. 63 - South and Higgins



Recommendation: See Figure 22.

1. Restrict parking on the north side of South Avenue for the entire block east of the intersection.

2. Restripe the east approach to provide a 300-foot-long left turn bay.

3. Reconstruct the south curb line on the west approach to produce a smooth, tapered effect into the widened pavement section. Parking should be restricted within 250 feet of the intersection on the south side of the west approach.

4. Restripe the west approach to provide three 11-foot-wide approach lanes. The left turn bay should be 100 feet long.

Cost: $18,600

Maintenance Jurisdiction: City (State Contract)

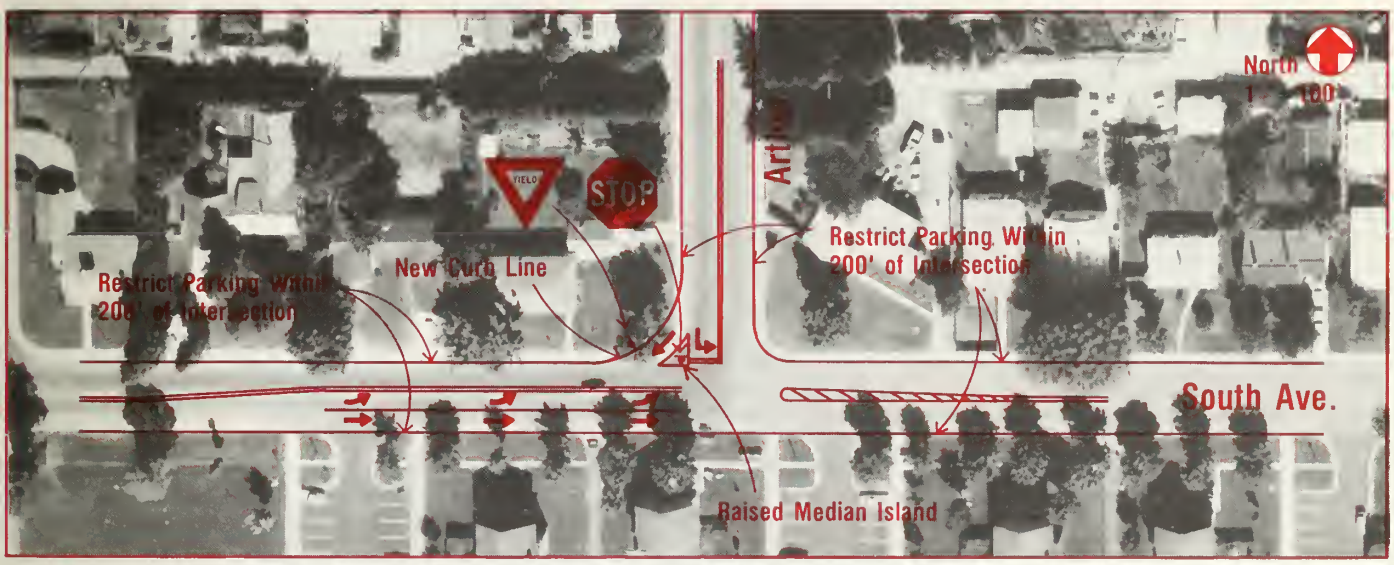
Possible Funding Source: Federal Aid Urban Funds
State Maintenance Funds

TSM: 64

Location: South and Arthur

Problem: Long delays are commonplace on the north approach to this intersection.

Figure 23
TSM No. 64 - South and Arthur



Recommendation: See Figure 23.

1. Restrict parking back 200 feet from the intersection on both sides of all through approaches.

2. Reconstruct the northwest corner of the intersection providing a raised median island and a right-turn ramp (see Figure).

3. Stripe the west approach with a 12-foot left turn bay and a 12-foot through lane.

Cost: $14,200

Maintenance Jurisdiction:	City
Possible Funding Source:	Federal Aid Urban Funds City Gas Tax Fund

---

TSM:	65
Location:	Brooks and Reserve
Problem:	This intersection is operating at capacity and often experiences long delays on the north approach.
Recommendation:	To effectively increase the capacity of this intersection, additional lanes are required. This improvement is scheduled to occur as part of the Reserve Street improvement project. The only TSM improvement recommended at this location is to stripe the east approach as a four-lane approach. The present ten-foot shoulder lane is commonly used as a right turn and should be striped accordingly. To provide for the bicyclist, a 25-foot-long, two-foot-wide bike lane should be painted adjacent to the outside through lane.
Cost:	$100
Maintenance Jurisdiction:	City (State Contract)
Possible Funding Source:	State Maintenance Funds

TSM:	66
Location:	Brooks (Dixon to Clark Fork Bridge)
Problem:	This principal arterial is presently at its full design width and should be illuminated.
Recommendation:	Install a roadway lighting system along this corridor.
Cost:	$333,500
Maintenance Jurisdiction:	State
Possible Funding Source:	Federal Aid Urban Funds State Maintenance Funds

---

TSM: 67

Location: Brooks and Harve

Problem: Parked vehicles on the north side of Harve, adjacent to the Brooks Street intersection, create a narrow passage for westbound traffic. This tends to slow traffic and cause congestion.

Recommendation: Restrict parking on the north side of Harve within 150 feet of the Brooks Street intersection.

Cost: $225

Maintenance Jurisdiction: City

Possible Funding Source: City Gas Tax Fund

TSM: 68

Location: 39th Street (Russell to U.S. 93)

Problem: The bike path adjacent to the south side of 39th creates a safety problem by encouraging westbound bicyclists to ride on the wrong side of the road.

The pedestrian/bicycle path along the south side of 39th Street creates a safety problem.

Recommendation:	Construct a four-foot-wide paved shoulder on the north side of 39th Street. This shoulder will not only provide for westbound bicycle traffic but will also improve vehicular travel characteristics.
Cost:	$42,300
Maintenance Jurisdiction:	City County
Possible Funding Source:	Federal Aid Urban Funds City Gas Tax Fund County Road Fund

---

TSM:	69
Location:	Reserve and 39th
Problem:	Left turns from the west approach are difficult to make during peak periods often causing congestion on 39th.
Recommendation:	Widen the south side of 39th enough to provide a 50-foot-long, 12-foot-wide left turn bay on the west approach.
Cost:	$8,000
Maintenance Jurisdiction:	County
Possible Funding Source:	Federal Aid Urban Funds County Road Fund

---

TSM:	70
Location:	23rd/Dore/39th
Problem:	Long delays are experienced on both north and south approaches to this intersection. Left turns off of 39th are becoming increasingly more difficult to make due to the traffic on 39th.
Recommendation:	1. Restrict parking back 300 feet from the intersection on both sides of the north and south approaches. 2. Restripe the north and south approaches to provide an 11-foot-wide exclusive left turn and an 11-foot-wide shared through/right lane.

3. Widen the north side of 39th Street enough to provide a 75-foot-long, 12-foot-wide left turn bay on both east and west approaches.

Cost: $16,800

Maintenance Jurisdiction: County

Possible Funding Source: Federal Aid Urban Funds
County Road Fund

TSM: 71

Location: Southwest Higgins/Stephens/High Park Way

Problem: Traffic congestion occurs at this location due to delays caused by left turn maneuvers. There is a sight distance problem caused by the grade of the vertical curve on Southwest Higgins.

Recommendation:

1. Restrict parking back 200 feet on the north approach and stripe it to accommodate two approach lanes.

2. Extend pavement markings indicating the presence of the left turn bay back 200 feet from the intersection on both east and west approaches. To further identify the special lane use on the east and west approaches, install lane use signs 200 feet back from the intersection.

3. When this portion of Southwest Higgins is upgraded, the use of a flatter vertical curve through this intersection would tend to minimize the built-in sight distance limitations.

Cost: $950

Maintenance Jurisdiction: City (State Contract)
City

Possible Funding Source: State Maintenance Funds
City Gas Tax Fund

TSM: 72

Location: Southwest Higgins and Bancroft

Problem: This intersection experiences peak hour congestion primarily due to left turn delays.

Recommendation:

1. On the north approach parking should be restricted back 200 feet on both sides and the approach striped to accommodate a two-lane approach.

2. Restrict parking along the north side of Southwest Higgins within 300 feet of the intersection.

3. Widen the north side of Southwest Higgins enough to provide a 100-foot-long, 12-foot-wide left turn bay for the west approach.

Cost: $8,300

Maintenance Jurisdiction: City (State Contract)
City

Possible Funding Source: Federal Aid Urban Funds
State Maintenance Funds
City Gas Tax Fund

TSM: 73

Location: 23rd Street

Problem: The street is approximately 34 feet wide without sidewalks or bicycle lanes. There is a need to provide for the pedestrian/bicyclist traffic along this corridor.

Recommendation: Stripe the entire length of 23rd street with two 12-foot driving lanes and two five-foot-wide pedestrian/ bicyclist lanes.

Cost: $800

Maintenance Jurisdiction: City
County

Possible Funding Source: City Gas Tax Fund
County Road Fund

TSM: 74

Location: 55th and Hillview Way

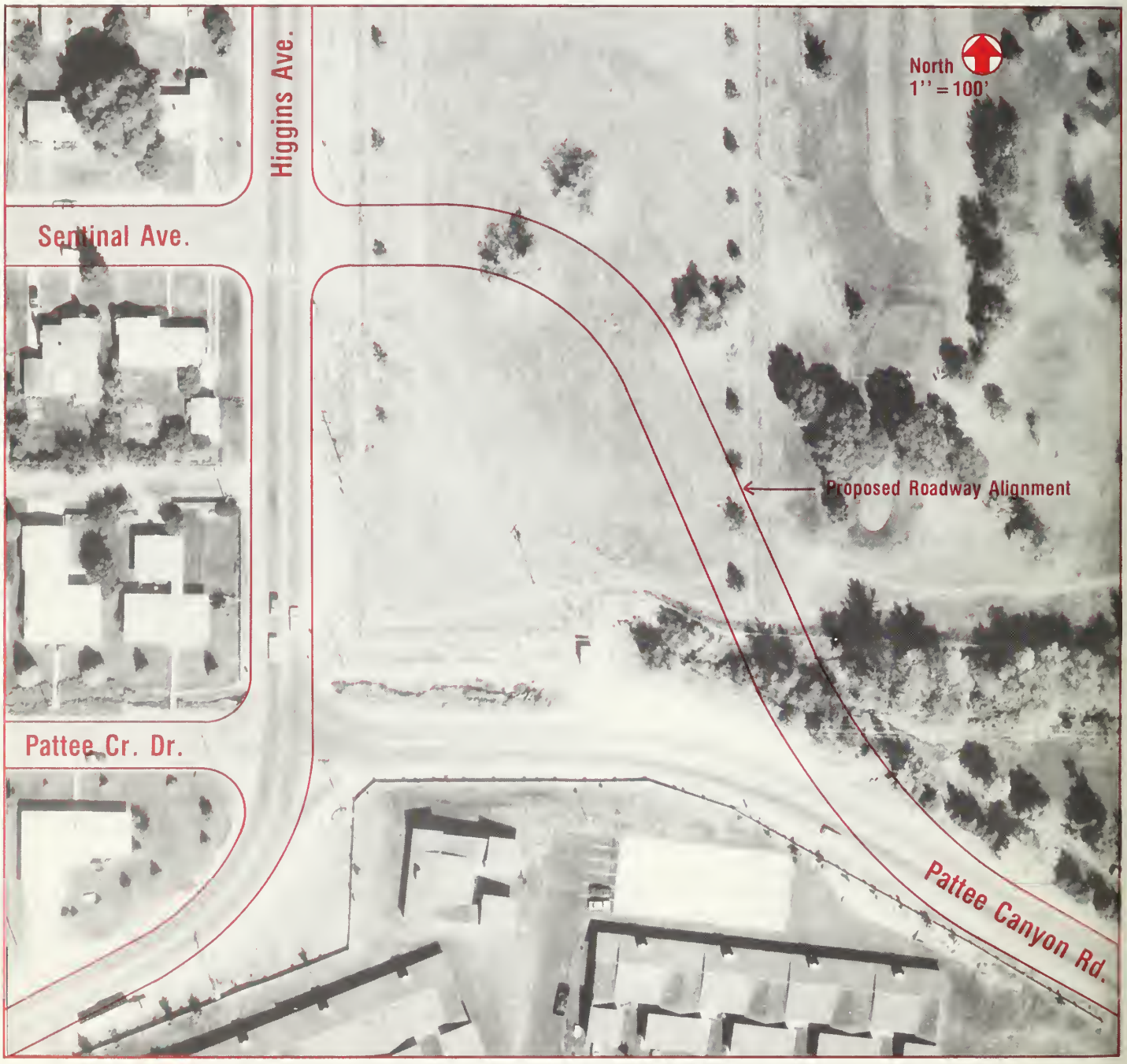
Problem: The general intersection geometrics, sight distance, and vehicle speeds have given cause for concern about safety problems at this location.

Recommendation:	1. Restrict parking on all sides of the big median island in the center of the intersection. Also restrict parking within 100 feet of all of the intersection corners and along the entire south side of Hillview Way through the intersection. 2. Install a "Y" intersection warning sign on the east approach to the intersection.
Cost:	$1,800
Maintenance Jurisdiction:	City
Possible Funding Source:	City Gas Tax Fund

TSM:	75
Location:	Hillview Way
Problem:	There is a lack of pedestrian and bicyclist facilities along most of Hillview Way.
Recommendation:	As this area develops, require developers to provide sidewalks on both sides as well as a roadway width sufficient to provide bicycle lanes on both sides of the travelway.
Cost:	Planning required.
Maintenance Jurisdiction:	--
Possible Funding Source:	--

TSM:	76
Location:	Higgins and Pattee Canyon Road
Problem:	This intersection is located adjacent to the curve at the south end of Higgins. This curve constitutes a major sight distance problem ; and as traffic volumes increase, the situation will worsen.
Recommendation:	See Figure 24. Realign Pattee Canyon Road so it intersects Higgins one block farther north at Sentinel Avenue. This location will provide the necessary room for the proper expansion of this intersection in the future.

Figure 24
TSM No. 76 - Higgins and Pattee Canyon Road



Cost: $120,000 (does not include right-of-way)

Maintenance Jurisdiction: City (State Contract)
City

Possible Funding Source: Federal Aid Urban Funds
State Maintenance Funds
City Gas Tax Fund

TSM: 77

Location: Pattee Canyon Road

Problem: This portion of Pattee Canyon Road had 59 accidents during the four and one-half year study period of which 47 were single vehicle accidents, 40 involved downhill traffic, 41 occurred at night, and 33 resulted in fixed object impacts.

Recommendation:

1. Install oversized warning signs at MP 0.0 and west of the picnic grounds that indicate "Winding road next three miles - speed limit 25 mph".

2. In the four sharpest curves where chevron warning signs are used, additional chevron signs should be installed to properly lead the motorist through the curve.

3. Install a series of reflectorized roadside delineators on both sides of the road for the entire length of the corridor.

4. All trees and brush should be cleared from along the side of the road to produce a 15-foot clear zone on both sides of the road.

5. Widen the south shoulder of the road by two feet and stripe the asphalt to provide a two-foot-wide paved bicycle lane for the uphill bicycle traffic.

Cost: $193,000

Maintenance Jurisdiction: County

Possible Funding Source: Federal Aid Secondary Funds
Safety Funds
County Road Fund

TSM: 78

Location: Demand Activated Signals

Problem: Comments from local bicyclists indicate a desire to locate the signal detector loops so their presence at a signal will be noted.

Recommendation:	Define the detector loops with small paint marks at the corners of the loop in the outermost travel lane.
Cost:	$1,500
Maintenance Jurisdiction:	City (State Contract)
Possible Funding Source:	State Maintenance Funds

TSM:	79
Location:	Storm Drain Grates
Problem:	Many of the storm drain grates around Missoula are hazardous to bicycle travelers.
Recommendation:	A program should be established whereby funds and manpower would be allocated to correct the more hazardous grates. In most cases welding several strips of flat steel to the grate will bicycle-proof the unit.
Cost:	$2,500
Maintenance Jurisdiction:	City (State Contract)
Possible Funding Source:	State Maintenance Funds

TSM:	80
Location:	Locations with bicycle paths or bicycle lanes on one side of the road only.
Problem:	Streets with widened or striped shoulders for pedestrian/bicyclist travel on one side of the road only create conflicts that could potentially lead to accidents. The conflicts are primarily caused by bicyclists riding against the flow of vehicle traffic. Roadways where this condition exists are:

39th - Reserve to Russell (addressed in TSM #70)

Clements Road - South to Seventh

South Avenue - Humble Road to Reserve

Rattlesnake Drive - Mountain View to Creek Crossing

Duncan Drive - Alvina to Lolo

South Seventh - Sky Drive to Hiberta

South Third - Reserve to Tower

Curtis - Dickinson School to River Road

Recommendation:

1. Where possible, restripe these roadways to provide equal width shoulders on both sides of the street.

2. When these streets are reconstructed in the future, equal paved shoulder widths of four feet each should be included in the design.

3. Local agencies should adopt a policy to avoid building one-side walkways in the future.

Cost: $3,000

Maintenance Jurisdiction: County

Possible Funding Source: County Road Fund

TSM: 81

Location: Greenough Road Railroad Crossing

Problem: This railroad crossing is currently ranked fourth in the state based on a hazard rating. On the average, 22 trains a day use this crossing along with approximately 4,000 vehicles a day. The existing crossing signals are inadequate, and this location meets the warrants for the use of crossing gates.

Recommendation: Remove the existing signals and install a new crossing signal system including three signal standards with multiple signal faces. Two separate signal faces should be provided for each approach on Greenough Road as well as the Second Street approach. Crossing gates should be provided on both Greenough Road approaches. The crossing itself should be upgraded at this time and the approaches restriped.

Cost: $175,000

Maintenance Jurisdiction: City

Possible Funding Source: City Gas Tax Fund
Rail-Highway Crossing Funds

TSM: 82

Location: All signalized intersections

Problem: In order to maximize the effectiveness of the major street network, the traffic signal system must operate properly. There are 43 traffic signals in the Missoula area which ultimately control the efficiency of the entire system.

Recommendation: Establish a signal maintenance program to periodically test all detectors and controllers for malfunctions and to establish proper phase timings. Like the urban area itself, the traffic demands placed on the signal system are in a constant state of change. A biannual examination by a qualified signal specialist can greatly improve the effectiveness of the existing system.

Cost: $11,000/yr.

Maintenance Jurisdiction: City (State Contract)
City

Possible Funding Source: State Maintenance Funds
City Gas Tax Fund

TSM: 83

Location: Broadway and Higgins

Problem: There is a need to reduce intersection delays caused by left turn movements on all approaches to this intersection.

Recommendation: Modify the signal to accommodate left turns. This will also require the addition of left turn bays on all approaches. This can be accomplished by removing the on-street parking within approximately 100 feet of the intersection.

Cost: $53,000

Maintenance Jurisdiction: City (State Contract)

Possible Funding Source: State Safety Funds
City Gas Tax Fund